the definition of an end-item is a component, accessory, attachment, firmware, or software.

[79 FR 61228, Oct. 10, 2014]

# PART 121—THE UNITED STATES MUNITIONS LIST

ENUMERATION OF ARTICLES



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SOURCE: 58 FR 39287, July 22, 1993, unless otherwise noted.

ENUMERATION OF ARTICLES

## § 121.1 The United States Munitions List.

(a) The following articles, services, and related technical data are designated as defense articles and defense services pursuant to sections 38 and 47(7) of the Arms Export Control Act. Changes in designations will be published in the FEDERAL REGISTER. Information and clarifications on whether specific items are defense articles and services under this subchapter may appear periodically through the Internet Web site of the Directorate of Defense Trade Controls.

(b)(1) *Order of review.* In order to classify your article on the U.S. Munitions List, you should begin with a review of the general characteristics of your item. This will usually guide you to the appropriate category on the U.S. Munitions List. Once the appropriate category is identified, you should match the particular characteristics and functions of your article to a specific entry within the appropriate category.

(2) *Composition of an entry.* Within each U.S. Munitions List category, defense articles are described by an alpha paragraph designation. These designations may include subparagraph(s) to further define the described defense article. Each U.S. Munitions List category starts with end-platform designations followed by major systems and equipment, and parts, components, accessories, and attachments. Most U.S. Munitions List categories contain an entry on technical data (see §120.10 of this subchapter) and defense services (see §120.9 of this subchapter) related to the defense articles described in that U.S. Munitions List category.

(3) *Significant military equipment.* An asterisk may precede an entry in a U.S. Munitions List category. The asterisk means the enumerated defense article is deemed to be ''Significant Military Equipment'' to the extent specified in §120.7 of this subchapter. Note that technical data directly related to the manufacture or production of any defense articles enumerated in any category designated as Significant Military Equipment (SME) is also designated as SME.

(c) *Missile Technology Control Regime (MTCR) Annex.* Inclusion in §121.16 of this subchapter, or annotation with the parenthetical ''(MT)'' at the end of a U.S. Munitions List paragraph, indicates those defense articles and defense services that are on the MTCR Annex. *See* §120.29 of this subchapter.

(d) *Specially designed.* When applying the definition of specially designed (*see* §120.41 of this subchapter), follow the sequential analysis set forth as follows:

(1) if your commodity or software is controlled for reasons other than having a specially designed control parameter on the U.S. Munitions List, no further review of the definition of specially designed is required.

(2) if your commodity or software is not enumerated on the U.S. Munitions List, it may be controlled because of a specially designed control parameter. If so, begin any analysis with §120.41(a) and proceed through each subsequent paragraph. If a commodity or software would not be controlled as a result of the application of the standards in §120.41(a), then it is not necessary to work through §120.41(b).

(3) if a commodity or software is controlled as a result of §120.41(a), then it is necessary to continue the analysis and to work through each of the elements of §120.41(b).

(4) commodities or software described in any §120.41(b) subparagraph are not

specially designed commodities or software controlled on the U.S. Munitions List, but may be subject to the jurisdiction of another U.S. Government regulatory agency (*see* §120.5 of this subchapter).

(e) *Classified.* For the purpose of this subchapter, ''classified'' means classified pursuant to Executive Order 13526, or predecessor order, and a security classification guide developed pursuant thereto or equivalent, or to the corresponding classification rules of another government or international organization.

CATEGORY I—FIREARMS, CLOSE ASSAULT WEAPONS AND COMBAT SHOTGUNS

*(a) Nonautomatic and semi-automatic firearms to caliber .50 inclusive (12.7 mm).

*(b) Fully automatic firearms to .50 caliber inclusive (12.7 mm).

*(c) Firearms or other weapons (e.g. insurgency-counterinsurgency, close assault weapons systems) having a special military application regardless of caliber.

*(d) Combat shotguns. This includes any shotgun with a barrel length less than 18 inches.

*(e) Silencers, mufflers, sound and flash suppressors for the articles in (a) through (d) of this category and their specifically designed, modified or adapted components and parts.

(f) Riflescopes manufactured to military specifications (See category XII(c) for controls on night sighting devices.)

*(g) Barrels, cylinders, receivers (frames) or complete breech mechanisms for the articles in paragraphs (a) through (d) of this category.

(h) Components, parts, accessories and attachments for the articles in paragraphs (a) through (g) of this category.

(i) Technical data (as defined in §120.10 of this subchapter) and defense services (as defined in §120.9 of this subchapter) directly related to the defense articles described in paragraphs (a) through (h) of this category. Technical data directly related to the manufacture or production of any defense articles described elsewhere in this category that are designated as Significant Military Equipment (SME) shall itself be designated SME.

(j) The following interpretations explain and amplify the terms used in this category and throughout this subchapter:

(1) A firearm is a weapon not over .50 caliber (12.7 mm) which is designed to expel a projectile by the action of an explosive or which may be readily converted to do so.

(2) A rifle is a shoulder firearm which can discharge a bullet through a rifled barrel 16 inches or longer.

(3) A carbine is a lightweight shoulder firearm with a barrel under 16 inches in length.

(4) A pistol is a hand-operated firearm having a chamber integral with or permanently aligned with the bore.

(5) A revolver is a hand-operated firearm with a revolving cylinder containing chambers for individual cartridges.

(6) A submachine gun, ''machine pistol'' or ''machine gun'' is a firearm originally designed to fire, or capable of being fired, fully automatically by a single pull of the trigger.

NOTE: This coverage by the U.S. Munitions List in paragraphs (a) through (i) of this category excludes any non-combat shotgun with a barrel length of 18 inches or longer, BB, pellet, and muzzle loading (black powder) firearms. This category does not cover riflescopes and sighting devices that are not manufactured to military specifications. It also excludes accessories and attachments (e.g., belts, slings, after market rubber grips, cleaning kits) for firearms that do not enhance the usefulness, effectiveness, or capabilities of the firearm, components and parts. The Department of Commerce regulates the export of such items. See the Export Administration Regulations (15 CFR parts 730–799). In addition, license exemptions for the items in this category are available in various parts of this subchapter (e.g., §§123.17, 123.18 and 125.4).

CATEGORY II—GUNS AND ARMAMENT

*(a) Guns over caliber .50 (*i.e.*, 12.7 mm), whether towed, airborne, self-propelled, or fixed, including but not limited to, howitzers, mortars, cannons, recoilless rifles, and grenade launchers.

(b) Flame throwers specifically designed or modified for military application.

(c) Apparatus and devices for launching or delivering ordnance, other than those articles controlled in Category IV.

*(d) Kinetic energy weapon systems specifically designed or modified for destruction or rendering mission-abort of a target.

(e) Signature control materials (e.g., parasitic, structural, coatings, screening) techniques, and equipment specifically designed, developed, configured, adapted or modified to alter or reduce the signature (e.g., muzzle flash suppression, radar, infrared, visual, laser/electro-optical, acoustic) of defense articles controlled by this category.

*(f) Engines specifically designed or modified for the self-propelled guns and howitzers in paragraph (a) of this category.

(g) Tooling and equipment specifically designed or modified for the production of defense articles controlled by this category.

(h) Test and evaluation equipment and test models specifically designed or modified for the articles controlled by this category. This includes but is not limited to diagnostic instrumentation and physical test models.

(i) Autoloading systems for electronic programming of projectile function for the defense articles controlled in this Category.

(j) All other components, parts, accessories, attachments and associated equipment specifically designed or modified for the articles in paragraphs (a) through (i) of this category. This includes but is not limited to mounts and carriages for the articles controlled in this category.

(k) Technical data (as defined in §120.10 of this subchapter) and defense services (as defined in §120.9 of this subchapter) directly related to the defense articles described in paragraphs (a) through (j) of this category. Technical data directly related to the manufacture or production of any defense articles described elsewhere in this category that are designated as Significant Military Equipment (SME) shall itself be designated SME.

(l) The following interpretations explain and amplify the terms used in this category and elsewhere in this subchapter:

(1) The kinetic energy weapons systems in paragraph (d) of this category include but are not limited to:

(i) Launch systems and subsystems capable of accelerating masses larger than 0.1g to velocities in excess of 1.6km/s, in single or rapid fire modes, using methods such as: electromagnetic, electrothermal, plasma, light gas, or chemical;

(ii) Prime power generation, electric armor, energy storage, thermal management; conditioning, switching or fuel-handling equipment; and the electrical interfaces between power supply gun and other turret electric drive function;

(iii) Target acquisition, tracking fire control or damage assessment systems; and

(iv) Homing seeker, guidance or divert propulsion (lateral acceleration) systems for projectiles.

(2) The articles in this category include any end item, component, accessory, attachment part, firmware, software or system that has been designed or manufactured using technical data and defense services controlled by this category.

(3) The articles specifically designed or modified for military application controlled in this category include any article specifically developed, configured, or adapted for military application.

CATEGORY III—AMMUNITION/ORDNANCE

*(a) Ammunition/ordnance for the articles in Categories I and II of this section.

(b) Ammunition/ordnance handling equipment specifically designed or modified for the articles controlled in this category, such as, belting, linking, and de-linking equipment.

(c) Equipment and tooling specifically designed or modified for the production of defense articles controlled by this category.

(d) Components, parts, accessories, attachments and associated equipment specifically designed or modified for the articles in this category:

*(1) Guidance and control components for the articles in paragraph (a) of this category;

*(2) Safing, arming and fuzing components (including target detection and localization devices) for the articles in paragraph (a) of this category; and

(3) All other components, parts, accessories, attachments and associated equipment for the articles in paragraphs (a) through (c) of this category.

(e) Technical data (as defined in §120.10 of this subchapter) and defense services (as defined in §120.9 of this subchapter) directly related to the defense articles described in paragraphs (a) through (d) of this category. Technical data directly related to the manufacture or production of any defense articles described elsewhere in this category that are designated as Significant Military Equipment (SME) shall itself be designated SME.

(f) The following explains and amplifies the terms used in this category and elsewhere in this subchapter:

(1) The components, parts, accessories and attachments controlled in this category include, but are not limited to cartridge cases, powder bags (or other propellant charges), bullets, jackets, cores, shells (excluding shotgun shells), projectiles (including canister rounds and submunitions therefor), boosters, firing components therefor, primers, and other detonating devices for the defense articles controlled in this category.

(2) This category does not control cartridge and shell casings that, prior to export, have been rendered useless beyond the possibility of restoration for use as a cartridge or shell casing by means of heating, flame treatment, mangling, crushing, cutting or popping.

(3) Equipment and tooling in paragraph (c) of this category does not include equipment for hand-loading ammunition.

(4) The articles in this category include any end item, component, accessory, attachment, part, firmware, software, or system that has been designed or manufactured using technical data and defense services controlled by this category.

(5) The articles specifically designed or modified for military application controlled in this category include any article specifically developed, configured, or adapted for military application

CATEGORY IV—LAUNCH VEHICLES, GUIDED MISSILES, BALLISTIC MISSILES, ROCKETS, TORPEDOES, BOMBS, AND MINES

*(a) Rockets, space launch vehicles (SLVs), missiles, bombs, torpedoes, depth charges, mines, and grenades, as follows:

(1) Rockets, SLVs, and missiles capable of delivering at least a 500-kg payload to a range of at least 300 km (MT);

(2) Rockets, SLVs, and missiles capable of delivering less than a 500-kg payload to a range of at least 300 km (MT);

(3) Man-portable air defense systems (MANPADS);

(4) Anti-tank missiles and rockets;

(5) Rockets, SLVs, and missiles not meeting the criteria of paragraphs (a)(1) through (a)(4) of this category;

(6) Bombs;

(7) Torpedoes;

(8) Depth charges;

(9) Anti-personnel, anti-vehicle, or anti-armor land mines (e.g., area denial devices);

(10) Anti-helicopter mines;

(11) Naval mines; or

(12) Fragmentation and high explosive hand grenades.

NOTE 1 TO PARAGRAPH (a): ''Range'' is the maximum distance that the specified rocket system is capable of traveling in the mode of stable flight as measured by the projection of its trajectory over the surface of the Earth. The maximum capability based on the design characteristics of the system, when fully loaded with fuel or propellant, will be taken into consideration in determining range. The range for rocket systems will be determined independently of any external factors such as operational restrictions, limitations imposed by telemetry, data links, or other external constraints. For rocket systems, the range will be determined using the trajectory that maximizes range, assuming International Civil Aviation Organization (ICAO) standard atmosphere with zero wind.

NOTE 2 TO PARAGRAPH (a): ''Payload'' is the total mass that can be carried or delivered by the specified rocket, SLV, or missile that is not used to maintain flight.

NOTE 3 TO PARAGRAPH (a): This paragraph does not control model and high power rockets (as defined in National Fire Protection Association Code 1122) and kits thereof made of paper, wood, fiberglass, or plastic containing no substantial metal parts and designed to be flown with hobby rocket motors that are certified for consumer use. Such rockets must not contain active controls (e.g., RF, GPS).

NOTE 4 TO PARAGRAPH (a): ''Mine'' means a munition placed under, on, or near the ground or other surface area and designed to be exploded by the presence, proximity, or contact of a person or vehicle.

*(b) Launchers for rockets, SLVs, and missiles, as follows:

(1) Fixed launch sites and mobile launcher mechanisms for any system enumerated in paragraphs (a)(1) and (a)(2) of this category (MT); or

(2) Fixed launch sites and mobile launcher mechanisms for any system enumerated in paragraphs (a)(3) through (a)(5) of this category (e.g., launch tables, TOW missile, MANPADS).

NOTE 1 TO PARAGRAPH (b): For controls on non-SLV launcher mechanisms for use on aircraft, *see* USML Category VIII(h).

NOTE 2 TO PARAGRAPH (b): For controls on launcher mechanisms that are integrated onto a vessel or ground vehicle, *see* USML Categories VI and VII, respectively.

NOTE 3 TO PARAGRAPH (b): This paragraph does not control parts and accessories (e.g., igniters, launch stands) specially designed for consumer use with model and high power rockets (as defined in National Fire Protection Association Code 1122) and kits thereof made of paper, wood, fiberglass, or plastic containing no substantial metal parts and designed to be flown with hobby rocket motors that are certified for consumer use.

(c) Apparatus and devices specially designed for the handling, control, activation, monitoring, detection, protection, discharge, or detonation of the articles enumerated in paragraphs (a) and (b) of this category (MT for those systems enumerated in paragraphs (a)(1), (a)(2), and (b)(1) of this category).

NOTE 1 TO PARAGRAPH (c): This paragraph includes specialized handling equipment (transporters, cranes, and lifts) specially designed to handle articles enumerated in paragraphs (a) and (b) of this category for preparation and launch from fixed and mobile sites. The equipment in this paragraph also includes specially designed robots, robot controllers, and robot end-effectors, and liquid propellant tanks specially designed for the storage or handling of the propellants controlled in USML Category V, CCL ECCNs 1C011, 1C111, and 1C608, or other liquid propellants used in the systems enumerated in paragraphs (a)(1), (a)(2), or (a)(5) of this category.

NOTE 2 TO PARAGRAPH (c): Aircraft Missile Protection Systems (AMPS) are controlled in USML Category XI.

*(d) Rocket, SLV, and missile power plants, as follows:

(1) Except as enumerated in paragraph (d)(2) or (d)(3) of this category, individual rocket stages for the articles enumerated in paragraph (a)(1), (a)(2), or (a)(5) of this category (MT for those stages usable in systems enumerated in paragraphs (a)(1) and (a)(2) of this category);

(2) Solid propellant rocket motors, hybrid or gel rocket motors, or liquid propellant rocket engines having a total impulse capacity equal to or greater than $1.1 \times 10^6$ N·s (MT);

(3) Solid propellant rocket motors, hybrid or gel rocket motors, or liquid propellant rocket engines having a total impulse capacity equal to or greater than $8.41 \times 10^5$ N·s, but less than $1.1 \times 10^6$ N·s (MT);

(4) Combined cycle, pulsejet, ramjet, or scramjet engines (MT);

(5) Air-breathing engines that operate above Mach 4 not enumerated in paragraph (d)(4) of this category;

(6) Pressure gain combustion-based propulsion systems not enumerated in paragraphs (d)(4) and (d)(5) of this category; or

(7) Rocket, SLV, and missile engines and motors, not otherwise enumerated in paragraphs (d)(1) through (d)(6) of this category or USML Category XIX.

NOTE TO PARAGRAPH (d): This paragraph does not control model and high power rocket motors, containing no more than 5 pounds of propellant, that are certified for U.S. consumer use as described in National Fire Protection Association Code 1125.

(e)–(f) [Reserved]

*(g) Non-nuclear warheads for rockets, bombs, and missiles (e.g., explosive, kinetic, EMP, thermobaric, shape charge, and fuel air explosive (FAE)).

(h) Systems, subsystems, parts, components, accessories, attachments, or associated equipment, as follows:

(1) Flight control and guidance systems (including guidance sets) specially designed for articles enumerated in paragraph (a) of this category (MT for those articles enumerated in paragraphs (a)(1) and (a)(2) of this category);

NOTE TO PARAGRAPH (h)(1): A guidance set integrates the process of measuring and computing a vehicle's position and velocity (*i.e.*, navigation) with that of computing and sending commands to the vehicle's flight control systems to correct the trajectory.

(2) Seeker systems specially designed for articles enumerated in paragraph (a) of this category (e.g., radiofrequency, infrared) (MT for articles enumerated in paragraphs (a)(1) and (a)(2) of this category);

(3) Kinetic kill vehicles and specially designed parts and components therefor;

(4) Missile or rocket thrust vector control systems (MT for those thrust vector control systems usable in articles enumerated in paragraph (a)(1) of this category);

(5) MANPADS grip stocks and specially designed parts and components therefor;

(6) Rocket or missile nozzles and nozzle throats, and specially designed parts and components therefor (MT for those nozzles and nozzle throats usable in systems enumerated in paragraphs (a)(1) and (a)(2) of this category);

(7) Rocket or missile nose tips, nose fairings, or aerospikes, and specially designed parts and components therefor (MT for those articles enumerated in paragraphs (a)(1) and (a)(2) of this category);

(8) Re-entry vehicle or warhead heat shields (MT for those re-entry vehicles and heat shields usable in systems enumerated in paragraph (a)(1) of this category);

(9) Missile and rocket safing, arming, fuzing, and firing (SAFF) components (to include target detection and proximity sensing devices), and specially designed parts therefor (MT for those SAFF components usable in systems enumerated in paragraph (a)(1) of this category);

(10) Self-destruct systems specially designed for articles enumerated in paragraph (a) of this category (MT for those articles enumerated in paragraphs (a)(1) and (a)(2) of this category);

(11) Separation mechanisms, staging mechanisms, and interstages useable for articles enumerated in paragraph (a) of this category, and specially designed parts and components therefor (MT for those separation mechanisms, staging mechanisms, and interstages usable in systems enumerated in paragraph (a)(1) of this category);

(12) Post-boost vehicles (PBV) (MT);

(13) Engine or motor mounts specially designed for articles enumerated in paragraphs (a) and (b) of this category (MT for those articles enumerated in paragraphs (a)(1), (a)(2), and (b)(1) of this category);

(14) Combustion chambers specially designed for articles enumerated in paragraphs (a) and (d) of this category and specially designed parts and components therefor (MT for those articles enumerated in paragraphs (a)(1), (a)(2), (b)(1), and (d)(1) through (d)(5) of this category);

(15) Injectors specially designed for articles controlled in this category (MT for those injectors specially designed which are usable in systems enumerated in paragraph (a)(1) of this category);

(16) Solid rocket motor or liquid engine igniters;

(17) Re-entry vehicles and specially designed parts and components therefor not elsewhere specified in this category (MT);

NOTE TO PARAGRAPH (h)(17): This paragraph does not control spacecraft. For controls on spacecraft, *see* USML Category XV and, if not described therein, then CCL ECCN 9A515.

(18) Specially designed parts and components for articles controlled in paragraph (g) not elsewhere specified in this category;

(19) Penetration aids and specially designed parts and components therefor (e.g., physical or electronic countermeasure suites, re-entry vehicle replicas or decoys, or submunitions);

(20) Rocket motor cases and specially designed parts and components therefor (e.g., flanges, flange seals, end domes) (MT for those rocket motor cases usable in systems enumerated in paragraphs (a)(1) and (a)(2) of this category and for specially designed parts and components for hybrid rocket motors enumerated in paragraphs (d)(2) and (d)(3) of this category);

(21) Solid rocket motor liners and rocket motor insulation (MT for those solid rocket

motor liners usable in systems enumerated in paragraph (a)(1) of this category or specially designed for systems enumerated in paragraph (a)(2) of this category; and rocket motor insulation usable in systems enumerated in paragraphs (a)(1) and (a)(2) of this category);

(22) Radomes, sensor windows, and antenna windows specially designed for articles enumerated in paragraph (a) of this category (MT for those radomes usable in systems enumerated in paragraph (a)(1) of this category and for any radomes, sensor windows, or antenna windows manufactured as composite structures or laminates specially designed for use in the systems and components enumerated in paragraph (a)(1), (a)(2), (d)(1), (h)(8), (h)(9), (h)(17), or (h)(25) of this category);

(23) Rocket or missile payload fairings;

(24) Rocket or missile launch canisters (MT for those rocket or missile launch canisters designed or modified for systems enumerated in paragraphs (a)(1) and (a)(2) of this category);

(25) Fuzes specially designed for articles enumerated in paragraph (a) of this category (e.g., proximity, contact, electronic, dispenser proximity, airburst, variable time delay, or multi-option) (MT for those fuzes usable in systems enumerated in paragraph (a)(1) of this category);

(26) Rocket or missile liquid propellant tanks (MT for those rocket or missile liquid propellant tanks usable in systems enumerated in paragraph (a)(1) of this category);

(27) Rocket or missile altimeters specially designed for use in articles enumerated in paragraph (a)(1) of this category (MT);

(28) Pneumatic, hydraulic, mechanical, electro-optical, or electromechanical flight control systems (including fly-by-wire systems) and attitude control equipment specially designed for use in the rockets or missiles enumerated in paragraph (a)(1) of this category (MT for these systems which have been designed or modified for those enumerated in paragraph (a)(1) of this category);

(29) Umbilical and interstage electrical connectors specially designed for use in the rockets or missiles enumerated in paragraph (a)(1) or (a)(2) of this category (MT); or

NOTE TO PARAGRAPH (h)(29): This paragraph also includes electrical connectors installed between the systems specified in paragraph (a)(1) or (a)(2) of this category and their payload.

*(30) Any part, component, accessory, attachment, equipment, or system that (MT for those articles designated as such):

(i) Is classified;

(ii) Contains classified software directly related to defense articles in this subchapter or 600 series items subject to the EAR; or

(iii) Is being developed using classified information.

NOTE TO PARAGRAPH (h)(30): ''Classified'' means classified pursuant to Executive Order 13526, or predecessor order, and a security classification guide developed pursuant thereto or equivalent, or to the corresponding classification rules of another government or international organization.

(i) Technical data (*see* §120.10 of this subchapter) and defense services (*see* §120.9 of this subchapter) directly related to the defense articles described in paragraphs (a) through (h) of this category and classified technical data directly related to items controlled in ECCNs 0A604, 0B604, 0D604, 9A604, 9B604, or 9D604 and defense services using the classified technical data. Defense services include the furnishing of assistance (including training) to a foreign person in the integration of a satellite or spacecraft to a launch vehicle, including both planning and onsite support, regardless of the jurisdiction, ownership, or origin of the satellite or spacecraft, or whether technical data is used. It also includes the furnishing of assistance (including training) to a foreign person in the launch failure analysis of a launch vehicle, regardless of the jurisdiction, ownership, or origin of the launch vehicle, or whether technical data is used. (*See* §125.4 of this subchapter for exemptions, and §124.15 of this subchapter for special export controls for spacecraft and spacecraft launches.) (MT for technical data and defense services related to articles designated as such.)

(j)–(w) [Reserved]

(x) Commodities, software, and technical data subject to the EAR (*see* §120.42 of this subchapter) used in or with defense articles controlled in this category.

NOTE TO PARAGRAPH (x): Use of this paragraph is limited to license applications for defense articles controlled in this category where the purchase documentation includes commodities, software, or technical data subject to the EAR (*see* §123.1(b) of this subchapter).

NOTE TO CATEGORY IV: If a Missile Technology Control Regime Category I item is included in a system, that system will also be considered as a Category I item, except when the incorporated item cannot be separated, removed, or duplicated.

CATEGORY V—EXPLOSIVES AND ENERGETIC MATERIALS, PROPELLANTS, INCENDIARY AGENTS, AND THEIR CONSTITUENTS

*(a) Explosives, and mixtures thereof, as follows:

(1) ADNBF (aminodinitrobenzofuroxan or 7-Amino 4,6-dinitrobenzofurazane-1-oxide) (CAS 97096–78–1);

(2) BNCP (cis-bis(5-nitrotetrazolato) tetra amine-cobalt (III) perchlorate) (CAS 117412–28–9);

(3) CL–14 (diaminodinitrobenzofuroxan or 5,7-diamino-4,6-dinitrobenzofurazane-1-oxide) (CAS 117907–74–1);
(4) CL–20 (HNIW or Hexanitrohexaazaisowurtzitane) (CAS 135285–90–4); clathrates of CL–20 (MT for CL–20);
(5) CP (2-(5-cyanotetrazolato) penta aminecobalt (III) perchlorate) (CAS 70247–32–4);
(6) DADE (1,1-diamino-2,2-dinitroethylene, FOX–7) (CAS 145250–81–3);
(7) DATB (Diaminotrinitrobenzene) (CAS 1630–08–6);
(8) DDFP (1,4-dinitrodifurazanopiperazine);
(9) DDPO (2,6-diamino-3,5-dinitropyrazine-1-oxide, PZO) (CAS 194486–77–6);
(10) DIPAM (3,3′-Diamino-2,2′,4,4′,6,6′-hexanitrobiphenyl or dipicramide) (CAS 17215–44–0);
(11) DNAN (2,4-Dinitroanisole) (CAS 119–27–7);
(12) DNGU (DINGU or dinitroglycoluril) (CAS 55510–04–8);
(13) Furazans, as follows:
(i) DAAOF (DAAF, DAAFox, or diaminoazoxyfurazan);
(ii) DAAzF (diaminoazofurazan) (CAS 78644–90–3);
(iii) ANF (Furazanamine, 4-nitro- or 3-Amino-4-nitrofurazan; or 4-Nitro-1,2,5-oxadiazol-3-amine; or 4-Nitro-3-furazanamine; CAS 66328–69–6); or
(iv) ANAzF (Aminonitroazofurazan or 1,2,5-Oxadiazol-3-amine, 4-[2-(4-nitro-1,2,5-oxadiazol-3-yl) diazenyl]; or 1,2,5-Oxadiazol-3-amine, 4-[(4-nitro-1,2,5-oxadiazol-3-yl)azo]-(9CI); or Furazanamine, 4-[(nitrofurananyl)azo]-; or 4-[(4-Nitro-1,2,5-oxadiazol-3-yl)azo]-1,2,5-oxadiazol-3-amine) (CAS 155438–11–2);
(14) GUDN (Guanylurea dinitramide) FOX–12 (CAS 217464–38–5);
(15) HMX and derivatives, as follows:
(i) HMX (Cyclotetramethylenetetranitramine; octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazine; 1,3,5,7-tetranitro-1,3,5,7-tetraza-cyclooctane; octogen, octogene) (CAS 2691–41–0) (MT);
(ii) Difluoroaminated analogs of HMX; or
(iii) K–55 (2,4,6,8-tetranitro-2,4,6,8-tetraazabicyclo [3,3,0]-octanone-3, tetranitrosemiglycouril, or keto-bicyclic HMX) (CAS 130256–72–3);
(16) HNAD (hexanitroadamantane) (CAS 143850–71–9);
(17) HNS (hexanitrostilbene) (CAS 20062–22–0);
(18) Imidazoles, as follows:
(i) BNNII (Octohydro-2,5-bis(nitroimino) imidazo [4,5-d]imidazole);
(ii) DNI (2,4-dinitroimidazole) (CAS 5213–49–0);
(iii) FDIA (1-fluoro-2,4-dinitroimidazole);
(iv) NTDNIA (N-(2-nitrotriazolo)-2,4-dinitro-imidazole); or
(v) PTIA (1-picryl-2,4,5-trinitroimidazole);
(19) NTNMH (1-(2-nitrotriazolo)-2-dinitromethylene hydrazine);
(20) NTO (ONTA or 3-nitro-1,2,4-triazol-5-one) (CAS 932–64–9);
(21) Polynitrocubanes with more than four nitro groups;
(22) PYX (2,6-Bis(picrylamino)-3,5-dinitropyridine) (CAS 38082–89–2);
(23) RDX and derivatives, as follows:
(i) RDX (cyclotrimethylenetrinitramine), cyclonite, T4, hexahydro-1,3,5-trinitro-1,3,5-triazine, 1,3,5-trinitro-1,3,5-triaza-cyclohexane, hexogen, or hexogene) (CAS 121–82–4) (MT);
(ii) Keto-RDX (K–6 or 2,4,6-trinitro-2,4,6-triazacyclohexanone) (CAS 115029–35–1); or
(iii) Difluoraminated derivative of RDX; 1,3-Dinitro-5,5-bis(difluoramino)1,3-diazahexane (CAS No. 193021–34–0);
(24) TAGN (Triaminoguanidinenitrate) (CAS 4000–16–2);
(25) TATB (Triaminotrinitrobenzene) (CAS 3058–38–6);
(26) TEDDZ (3,3,7,7-tetrakis(difluoroamine) octahydro-1,5-dinitro-1,5-diazocine;
(27) Tetrazines, as follows:
(i) BTAT (Bis(2,2,2-trinitroethyl)-3,6-diaminotetrazine); or
(ii) LAX–112 (3,6-diamino-1,2,4,5-tetrazine-1,4-dioxide);
(28) Tetrazoles, as follows:
(i) NTAT (nitrotriazolaminotetrazole); or
(ii) NTNT (1-N-(2-nitrotriazolo)-4-nitrotetrazole);
(29) Tetryl (trinitrophenylmethylnitramine) (CAS 479–45–8);
(30) TEX (4,10-Dinitro-2,6,8,12-tetraoxa-4,10-diazaisowurtzitane);
(31) TNAD (1,4,5,8-tetranitro-1,4,5,8-tetraazadecalin) (CAS 135877–16–6);
(32) TNAZ (1,3,3-trinitroazetidine) (CAS 97645–24–4);
(33) TNGU (SORGUYL or tetranitroglycoluril) (CAS 55510–03–7);
(34) TNP (1,4,5,8-tetranitro-pyridazino [4,5-d] pyridazine) (CAS 229176–04–9);
(35) Triazines, as follows:
(i) DNAM (2-oxy-4,6-dinitroamino-s-triazine) (CAS 19899–80–0); or
(ii) NNHT (2-nitroimino-5-nitro-hexahydro-1,3,5 triazine) (CAS 130400–13–4);
(36) Triazoles, as follows:
(i) 5-azido-2-nitrotriazole;
(ii) ADHTDN (4-amino-3,5-dihydrazino-1,2,4-triazole dinitramide) (CAS 1614–08–0);
(iii) ADNT (1-amino-3,5-dinitro-1,2,4-triazole);
(iv) BDNTA (Bis(dinitrotriazole)amine);
(v) DBT (3,3′-dinitro-5,5-bi-1,2,4-triazole) (CAS 30003–46–4);
(vi) DNBT (dinitrobistriazole) (CAS 70890–46–9);
(vii) NTDNT (1–N-(2-nitrotriazolo) 3,5-dinitro-triazole);
(viii) PDNT (1-picryl-3,5-dinitrotriazole); or

(ix) TACOT (tetranitrobenzotriazolobenzotriazole) (CAS 25243–36–1);

(37) Energetic ionic materials melting between 343 K (70 °C) and 373 K (100 °C) and with detonation velocity exceeding 6800 m/s or detonation pressure exceeding 18 GPa (180 kbar); or

(38) Explosives, not otherwise enumerated in this paragraph or on the CCL in ECCN 1C608, with a detonation velocity exceeding 8700 m/s at maximum density or a detonation pressure exceeding 34 Gpa (340 kbar).

*(b) Propellants, as follows (MT for composite and composite modified double-base propellants):

(1) Any solid propellant with a theoretical specific impulse (*see* paragraph (k)(4) of this category) greater than:

(i) 240 seconds for non-metallized, non-halogenated propellant;

(ii) 250 seconds for non-metallized, halogenated propellant; or

(iii) 260 seconds for metallized propellant;

(2) Propellants having a force constant of more than 1,200 kJ/Kg;

(3) Propellants that can sustain a steady-state burning rate more than 38 mm/s under standard conditions (as measured in the form of an inhibited single strand) of 6.89 Mpa (68.9 bar) pressure and 294K (21 °C);

(4) Elastomer-modified cast double-based propellants with extensibility at maximum stress greater than 5% at 233 K (−40 °C); or

(5) Other composite and composite modified double-base propellants.

(c) Pyrotechnics, fuels and related substances, and mixtures thereof, as follows:

(1) Alane (aluminum hydride) (CAS 7784–21–6);

(2) Carboranes; decaborane (CAS 17702–41–9); pentaborane and derivatives thereof (MT);

(3) Liquid high energy density fuels, as follows (MT):

(i) Mixed fuels that incorporate both solid and liquid fuels, such as boron slurry, having a mass-based energy density of 40 MJ/kg or greater; or

(ii) Other high energy density fuels and fuel additives (e.g., cubane, ionic solutions, JP–7, JP–10) having a volume-based energy density of 37.5 GJ per cubic meter or greater, measured at 20 °C and one atmosphere (101.325 kPa) pressure;

NOTE TO PARAGRAPH (c)(3)(ii): JP–4, JP–8, fossil refined fuels or biofuels, or fuels for engines certified for use in civil aviation are not included.

(4) Metal fuels, and fuel or pyrotechnic mixtures in particle form whether spherical, atomized, spheroidal, flaked, or ground, manufactured from material consisting of 99% or more of any of the following:

(i) Metals, and mixtures thereof, as follows:

(A) Beryllium (CAS 7440–41–7) in particle sizes of less than 60 micrometers (MT); or

(B) Iron powder (CAS 7439–89–6) with particle size of 3 micrometers or less produced by reduction of iron oxide with hydrogen;

(ii) Fuel mixtures or pyrotechnic mixtures, which contain any of the following:

(A) Boron (CAS 7440–42–8) or boron carbide (CAS 12069–32–8) fuels of 85% purity or higher and particle sizes of less than 60 micrometers; or

(B) Zirconium (CAS 7440–67–7), magnesium (CAS 7439–95–4), or alloys of these in particle sizes of less than 60 micrometers;

(iii) Explosives and fuels containing the metals or alloys listed in paragraphs (c)(4)(i) and (c)(4)(ii) of this category whether or not the metals or alloys are encapsulated in aluminum, magnesium, zirconium, or beryllium;

(5) Fuel, pyrotechnic, or energetic mixtures having any nanosized aluminum, beryllium, boron, zirconium, magnesium, or titanium, as follows:

(i) Having particle size less than 200 nm in any direction; and

(ii) Having 60% or higher purity;

(6) Pyrotechnic and pyrophoric materials, as follows:

(i) Pyrotechnic or pyrophoric materials specifically formulated to enhance or control the production of radiated energy in any part of the IR spectrum; or

(ii) Mixtures of magnesium, polytetrafluoroethylene and the copolymer vinylidene difluoride and hexafluoropropylene (MT);

(7) Titanium subhydride (TiHn) of stoichiometry equivalent to n = 0.65–1.68; or

(8) Hydrocarbon fuels specially formulated for use in flame throwers or incendiary munitions containing metal stearates (e.g., octal) or palmitates, and M1, M2, and M3 thickeners.

(d) Oxidizers, as follows:

(1) ADN (ammonium dinitramide or SR–12) (CAS 140456–78–6) (MT);

(2) AP (ammonium perchlorate) (CAS 7790–98–9) (MT);

(3) BDNPN (bis(2,2-dinitropropyl)nitrate) (CAS 28464–24–6);

(4) DNAD (1,3-dinitro-1,3-diazetidine) (CAS 78246–06–7);

(5) HAN (Hydroxylammonium nitrate) (CAS 13465–08–2);

(6) HAP (hydroxylammonium perchlorate) (CAS 15588–62–2);

(7) HNF (Hydrazinium nitroformate) (CAS 20773–28–8) (MT);

(8) Hydrazine nitrate (CAS 37836–27–4) (MT);

(9) Hydrazine perchlorate (CAS 27978–54–7) (MT);

(10) Inhibited red fuming nitric acid (IRFNA) (CAS 8007–58–7) and liquid oxidizers comprised of or containing IRFNA or oxygen difluoride (MT for liquid oxidizers comprised of IRFNA); or

(11) Perchlorates, chlorates, and chromates composited with powdered metal or other high energy fuel components controlled under this category (MT).

*(e) Binders, and mixtures thereof, as follows:

(1) AMMO (azidomethylmethyloxetane and its polymers) (CAS 90683–29–7);

(2) BAMO-3-3 (bis(azidomethyl)oxetane and its polymers) (CAS 17607–20–4);

(3) BTTN (butanetriol trinitrate) (CAS 6659–60–5) (MT);

(4) FAMAO (3-difluoroaminomethyl-3-azidomethyloxetane) and its polymers;

(5) FEFO (bis(2-fluoro-2,2-dinitroethyl)formal) (CAS 17003–79–1);

(6) GAP (glycidyl azide polymer) (CAS 143178–24–9) and its derivatives (MT for GAP);

(7) HTPB (hydroxyl-terminated polybutadiene) with a hydroxyl functionality equal to or greater than 2.2 and less than or equal to 2.4, a hydroxyl value of less than 0.77 meq/g, and a viscosity at 30 °C of less than 47 poise (CAS 69102–90–5) (MT);

(8) 4,5 diazidomethyl-2-methyl-1,2,3-triazole (iso-DAMTR) (MT);

(9) NENAS (nitratoethylnitramine compounds), as follows:

(i) N-Methyl 2-nitratoethylnitramine (Methyl-NENA) (CAS 17096–47–8) (MT);

(ii) N-Ethyl 2-nitratoethylnitramine (Ethyl-NENA) (CAS 85068–73–1) (MT);

(iii) N-Propyl 2-nitratoethylnitramine (CAS 82486–83–7);

(iv) N-Butyl-2-nitratoethylnitramine (BuNENA) (CAS 82486–82–6); or

(v) N-Pentyl 2-nitratoethylnitramine (CAS 85954–06–9);

(10) Poly-NIMMO (poly nitratomethylmethyoxetane, poly-NMMO, (poly[3-nitratomethyl-3-methyl oxetane]) (CAS 84051–81–0);

(11) PNO (Poly(3-nitratooxetane));

(12) TVOPA 1,2,3-Tris [1,2-bis(difluoroamino)ethoxy]propane; tris vinoxy propane adduct (CAS 53159–39–0);

(13) Polynitrorthocarbonates;

(14) FPF–1 (poly-2,2,3,3,4,4-hexafluoro pentane-1,5-diolformal) (CAS 376–90–9);

(15) FPF–3 (poly-2,4,4,5,5,6,6-heptafluoro-2-trifluoromethyl-3-oxaheptane-1,7-diolformal);

(16) PGN (Polyglycidyl nitrate or poly(nitratomethyloxirane); poly-GLYN); (CAS 27814–48–8);

(17) N-methyl-p-nitroaniline (MT);

(18) Low (less than 10,000) molecular weight, alcohol-functionalized, poly(epichlorohydrin); poly(epichlorohydrindiol); and triol; or

(19) Dinitropropyl based plasticizers, as follows (MT):

(i) BDNPA (bis (2,2-dinitropropyl) acetal) (CAS 5108–69–0); or

(ii) BDNPF (bis (2,2-dinitropropyl) formal) (CAS 5917–61–3).

(f) Additives, as follows:

(1) Basic copper salicylate (CAS 62320–94–9);

(2) BHEGA (Bis-(2-hydroxyethyl)glycolamide) (CAS 17409–41–5);

(3) BNO (Butadienenitrile oxide);

(4) Ferrocene derivatives, as follows (MT):

(i) Butacene (CAS 125856–62–4);

(ii) Catocene (2,2-Bis-ethylferrocenylpropane) (CAS 37206–42–1);

(iii) Ferrocene carboxylic acids and ferrocene carboxylic acid esters;

(iv) n-butylferrocene (CAS 31904–29–7);

(v) Ethylferrocene (CAS 1273–89–8);

(vi) Propylferrocene;

(vii) Pentylferrocene (CAS 1274–00–6);

(viii) Dicyclopentylferrocene;

(ix) Dicyclohexylferrocene;

(x) Diethylferrocene (CAS 173–97–8);

(xi) Dipropylferrocene;

(xii) Dibutylferrocene (CAS 1274–08–4);

(xiii) Dihexylferrocene (CAS 93894–59–8);

(xiv) Acetylferrocene (CAS 1271–55–2)/1,1′-diacetyl ferrocene (CAS 1273–94–5); or

(xv) Other ferrocene derivatives that do not contain a six carbon aromatic functional group attached to the ferrocene molecule (MT if usable as rocket propellant burning rate modifier);

(5) Lead beta-resorcylate (CAS 20936–32–7);

(6) Lead citrate (CAS 14450–60–3);

(7) Lead-copper chelates of beta-resorcylate or salicylates (CAS 68411–07–4);

(8) Lead maleate (CAS 19136–34–6);

(9) Lead salicylate (CAS 15748–73–9);

(10) Lead stannate (CAS 12036–31–6);

(11) MAPO (tris-1-(2-methyl) aziridinylphosphine oxide) (CAS 57–39–6); BOBBA–8 (bis(2-methyl aziridinyl)-2-(2-hydroxypropanoxy) propylamino phosphine oxide); and other MAPO derivatives (MT for MAPO);

(12) Methyl BAPO (Bis(2-methyl aziridinyl)methylaminophosphine oxide) (CAS 85068–72–0);

(13) 3-Nitraza-1,5-pentane diisocyanate (CAS 7406–61–9);

(14) Organo-metallic coupling agents, as follows:

(i) Neopentyl[diallyl]oxy, tri [dioctyl] phosphatotitanate (CAS 103850–22–2); also known as titanium IV, 2,2[bis 2-propenolatomethyl, butanolato, tris (dioctyl) phosphato] (CAS 110438–25–0), or LICA 12 (CAS 103850–22–2);

(ii) Titanium IV, [(2-propenolato-1) methyl, n-propanolatomethyl] butanolato-1, tris(dioctyl)pyrophosphate, or KR3538; or

(iii) Titanium IV, [(2-propenolato-1)methyl, propanolatomethyl] butanolato-1, tris(dioctyl) phosphate;

(15) PCDE (Polycyanodifluoroaminoethylene oxide);

(16) Certain bonding agents, as follows (MT):

(i) 1,1R,1S-trimesoyl-tris(2-ethylaziridine) (HX–868, BITA) (CAS 7722–73–8); or

(ii) Polyfunctional aziridine amides with isophthalic, trimesic, isocyanuric, or

trimethyladipic backbone also having a 2-methyl or 2-ethyl aziridine group;

NOTE TO PARAGRAPH (f)(16)(ii): Included are (1) 1,1H-Isophthaloyl-bis(2-methylaziridine) (HX–752) (CAS 7652–64–4); (2) 2,4,6-tris(2-ethyl-1-aziridinyl)-1,3,5-triazine (HX–874) (CAS 18924–91–9); and (3) 1,1′-trimethyladipoylbis(2-ethylaziridine) (HX–877) (CAS 71463–62–2).

(17) Superfine iron oxide ($Fe_2O_3$, hematite) with a specific surface area more than 250 $m^2/g$ and an average particle size of 0.003 micrometers or less (CAS 1309–37–1);

(18) TEPAN (HX–879) (tetraethylenepentaamineacrylonitrile) (CAS 68412–45–3); cyanoethylated polyamines and their salts (MT for TEPAN (HX–879));

(19) TEPANOL (HX–878) (tetraethylenepentaamineacrylonitrileglycidol) (CAS 68412–46–4); cyanoethylated polyamines adducted with glycidol and their salts (MT for TEPANOL (HX–878));

(20) TPB (triphenyl bismuth) (CAS 603–33–8) (MT); or

(21) Tris (ethoxyphenyl) bismuth (TEPB) (CAS 90591–48–3).

(g) Precursors, as follows:

(1) BCMO (3,3-bis(chloromethyl)oxetane) (CAS 78–71–7);

(2) DADN (1,5-diacetyl-3,7-dinitro-1, 3, 5, 7-tetraazacyclooctane);

(3) Dinitroazetidine-t-butyl salt (CAS 125735–38–8);

(4) CL–20 precursors (any molecule containing hexaazaisowurtzitane) (e.g., HBIW (hexabenzylhexaazaisowurtzitane), TAIW (tetraacetyldibenzylhexa-azaisowurtzitane));

(5) TAT (1, 3, 5, 7-tetraacetyl-1, 3, 5, 7-tetraazacyclooctane) (CAS 41378–98–7);

(6) Tetraazadecalin (CAS 5409–42–7);

(7) 1,3,5-trichlorobenzene (CAS 108–70–3); or

(8) 1,2,4-trihydroxybutane (1,2,4-butanetriol) (CAS 3068–00–6).

*(h) Any explosive, propellant, pyrotechnic, fuel, oxidizer, binder, additive, or precursor that (MT for articles designated as such):

(1) Is classified; or

(2) Is being developed using classified information (*see* §120.10(a)(2) of this subchapter).

NOTE TO PARAGRAPH (h): ''Classified'' means classified pursuant to Executive Order 13526, or predecessor order, and a security classification guide developed pursuant thereto or equivalent, or to the corresponding classification rules of another government or international organization.

(i) Developmental explosives, propellants, pyrotechnics, fuels, oxidizers, binders, additives, or precursors therefor funded by the Department of Defense via contract or other funding authorization.

NOTE 1 TO PARAGRAPH (i): This paragraph does not control explosives, propellants, pyrotechnics, fuels, oxidizers, binders, additives, or precursors therefor (a) in production, (b) determined to be subject to the EAR via a commodity jurisdiction determination (*see* §120.4 of this subchapter), or (c) identified in the relevant Department of Defense contract or other funding authorization as being developed for both civil and military applications.

NOTE 2 TO PARAGRAPH (i): Note 1 does not apply to defense articles enumerated on the U.S. Munitions List, whether in production or development.

NOTE 3 TO PARAGRAPH (i): This paragraph is applicable only to those contracts and funding authorizations that are dated January 5, 2015, or later.

(j) Technical data (as defined in §120.10 of this subchapter) and defense services (as defined in §120.9 of this subchapter) directly related to the defense articles described in paragraphs (a) through (i) of this category (*see* also §123.20 of this subchapter) (MT for articles designated as such).

(k) The following interpretations explain and amplify the terms used in this category and elsewhere in this subchapter:

(1) USML Category V contains explosives, energetic materials, propellants, and pyrotechnics and specially formulated fuels for aircraft, missile, and naval applications. Explosives are solid, liquid, or gaseous substances or mixtures of substances, which, in their primary, booster, or main charges in warheads, demolition, or other military applications, are required to detonate.

(2) The resulting product of the combination or conversion of any substance controlled by this category into an item not controlled will no longer be controlled by this category provided the controlled item cannot easily be recovered through dissolution, melting, sieving, etc. As an example, beryllium converted to a near net shape using hot isostatic processes will result in an uncontrolled part. A cured thermoset containing beryllium powder is not controlled unless meeting an explosive or propellant control. The mixture of beryllium powder in a cured thermoset shape is not controlled by this category. The mixture of controlled beryllium powder mixed with a typical propellant binder will remain controlled by this category. The addition of dry silica powder to dry beryllium powder will remain controlled.

(3) Paragraph (c)(4)(ii)(A) of this category does not apply to boron and boron carbide enriched with boron-10 (20% or more of total boron-10 content).

(4) Theoretical specific impulse (Isp) is calculated using standard conditions (1000 psi chamber pressure expanded to 14.7 psi) and measured in units of pound-force-seconds per pound-mass (lbf-s/lbm) or simplified to seconds (s). Calculations will be based on shifting equilibrium.

(5) Particle size is the mean particle diameter on a weight basis. Best industrial

practices will be used in determining particle size and the controls may not be undermined by addition of larger or smaller sized material to shift the mean diameter.

(l)–(w) [Reserved]

(x) Commodities, software, and technical data subject to the EAR (*see* §120.42 of this subchapter) used in or with defense articles controlled in this category.

NOTE TO PARAGRAPH (x): Use of this paragraph is limited to license applications for defense articles controlled in this category where the purchase documentation includes commodities, software, or technical data subject to the EAR (*see* §123.1(b) of this subchapter).

NOTE 1 TO USML CATEGORY V: To assist the exporter, an item has been categorized by the most common use. Also, where appropriate, references have been provided to the related controlled precursors.

NOTE 2 TO USML CATEGORY V: Chemical Abstract Service (CAS) registry numbers do not cover all the substances and mixtures controlled by this category. The numbers are provided as examples to assist government agencies in the license review process and exporters when completing their license application and export documentation.

### CATEGORY VI—SURFACE VESSELS OF WAR AND SPECIAL NAVAL EQUIPMENT

*(a) Warships and other combatant vessels (*i.e.*, battleships, aircraft carriers, destroyers, frigates, cruisers, corvettes, littoral combat ships, mine sweepers, mine hunters, mine countermeasure ships, dock landing ships, amphibious assault ships), Coast Guard Cutters (with or equivalent to those with U.S. designations WHEC, WMEC, WMSL, or WPB for the purpose of this subchapter), or foreign-origin vessels specially designed to provide functions equivalent to those of the vessels listed above;

(b) Other vessels not controlled in paragraph (a) of this category, as follows:

(1) High-speed air cushion vessels for transporting cargo and personnel, ship-to-shore and across a beach, with a payload over 25 tons;

(2) Surface vessels integrated with nuclear propulsion plants or specially designed to support naval nuclear propulsion plants;

(3) Vessels armed or specially designed to be used as a platform to deliver munitions or otherwise destroy or incapacitate targets (e.g., firing lasers, launching torpedoes, rockets, or missiles, or firing munitions greater than .50 caliber); or

(4) Vessels incorporating any mission systems controlled under this subchapter.

NOTE TO PARAGRAPH (b)(4): ''Mission systems'' are defined as ''systems'' (*see* §120.45(g) of this subchapter) that are defense articles that perform specific military functions such as by providing military communication, electronic warfare, target designation, surveillance, target detection, or sensor capabilities.

NOTE TO PARAGRAPHS (a) AND (b): Vessels specially designed for military use that are not identified in paragraph (a) or (b) of this category are subject to the EAR under ECCN 8A609, including any demilitarized vessels, regardless of origin or designation, manufactured prior to 1950 and unmodified since 1949. Vessels with modifications made to incorporate safety features required by law, are cosmetic (e.g., different paint), or that add parts or components otherwise available prior to 1950 are considered ''unmodified'' for the purposes of this paragraph.

(c) Developmental vessels, and specially designed parts, components, accessories, and attachments therefor, funded by the Department of Defense via contract or other funding authorization.

NOTE 1 TO PARAGRAPH (c): This paragraph does not control vessels, and specially designed parts, components, accessories, and attachments therefor, (a) in production, (b) determined to be subject to the EAR via a commodity jurisdiction determination (*see* §120.4 of this subchapter), or (c) identified in the relevant Department of Defense contract or other funding authorization as being developed for both civil and military applications.

NOTE 2 TO PARAGRAPH (c): Note 1 does not apply to defense articles enumerated on the U.S. Munitions List, whether in production or development.

NOTE 3 TO PARAGRAPH (c): This provision is applicable to those contracts and funding authorizations that are dated July 8, 2014, or later.

(d) [Reserved]

*(e) Naval nuclear propulsion plants and prototypes, and special facilities for construction, support, and maintenance therefor (*see* §123.20 of this subchapter).

(f) Vessel and naval equipment, parts, components, accessories, attachments, associated equipment, and systems, as follows:

(1) Hulls or superstructures, including support structures therefor, that:

(i) Are specially designed for any vessels controlled in paragraph (a) of this category;

(ii) Have armor, active protection systems, or developmental armor systems; or

(iii) Are specially designed to survive 12.5% or greater damage across the length as measured between perpendiculars;

(2) Systems that manage, store, create, distribute, conserve, and transfer energy, and specially designed parts and components therefor, that have:

(i) Storage exceeding 30MJ;

(ii) A discharge rate less than 3 seconds; and

(iii) A cycle time under 45 seconds;

(3) Shipborne auxiliary systems for chemical, biological, radiological, and nuclear (CBRN) compartmentalization, over-pressurization and filtration systems, and specially designed parts and components therefor;

*(4) Control and monitoring systems for autonomous unmanned vessels capable of onboard, autonomous perception and decision-making necessary for the vessel to navigate while avoiding fixed and moving hazards, and obeying rules-of-the road without human intervention;

*(5) Any machinery, device, component, or equipment, including production, testing and inspection equipment, and tooling, specially designed for plants or facilities controlled in paragraph (e) of this section (*see* §123.20 of this subchapter);

(6) Parts, components, accessories, attachments, and equipment specially designed for integration of articles controlled by USML Categories II, IV, or XVIII or catapults for launching aircraft or arresting gear for recovering aircraft (MT for launcher mechanisms specially designed for rockets, space launch vehicles, or missiles capable of achieving a range greater than or equal to 300 km);

NOTE TO PARAGRAPH (f)(6): ''Range'' is the maximum distance that the specified rocket system is capable of traveling in the mode of stable flight as measured by the projection of its trajectory over the surface of the Earth. The maximum capability based on the design characteristics of the system, when fully loaded with fuel or propellant, will be taken into consideration in determining range. The range for rocket systems will be determined independently of any external factors such as operational restrictions, limitations imposed by telemetry, data links, or other external constraints. For rocket systems, the range will be determined using the trajectory that maximizes range, assuming International Civil Aviation Organization (ICAO) standard atmosphere with zero wind.

(7) Shipborne active protection systems (*i.e.*, defensive systems that actively detect and track incoming threats and launch a ballistic, explosive, energy, or electromagnetic countermeasure(s) to neutralize the threat prior to contact with a vessel) and specially designed parts and components therefor;

(8) Minesweeping and mine hunting equipment (including mine countermeasures equipment deployed by aircraft), and specially designed parts and components therefor; or

*(9) Any part, component, accessory, attachment, equipment, or system that:

(i) Is classified;

(ii) Contains classified software directly related to defense articles in this subchapter or 600 series items subject to the EAR; or

(iii) Is being developed using classified information. ''Classified'' means classified pursuant to Executive Order 13526, or predecessor order, and a security classification guide developed pursuant thereto or equivalent, or to the corresponding classification rules of another government or international organization.

NOTE 1 TO PARAGRAPH (f): Parts, components, accessories, attachments, associated equipment, and systems specially designed for vessels enumerated in this category but not listed in paragraph (f) are subject to the EAR under ECCN 8A609.

NOTE 2 TO PARAGRAPH (f): For controls related to ship signature management, *see* USML Category XIII.

(g) Technical data (*see* §120.10 of this subchapter) and defense services (*see* §120.9 of this subchapter) directly related to the defense articles enumerated in paragraphs (a) through (f) of this category and classified technical data directly related to items controlled in ECCNs 8A609, 8B609, 8C609, and 8D609 and defense services using the classified technical data. (MT for technical data and defense services related to articles designated as such.)

(*See* §125.4 of this subchapter for exemptions.)

(h)–(w) [Reserved]

(x) Commodities, software, and technical data subject to the EAR (*see* §120.42 of this subchapter) used in or with defense articles controlled in this category.

NOTE TO PARAGRAPH (x): Use of this paragraph is limited to license applications for defense articles controlled in this category where the purchase documentation includes commodities, software, or technical data subject to the EAR (*see* §123.1(b) of this subchapter).

### CATEGORY VII—GROUND VEHICLES

*(a) Armored combat ground vehicles as follows:

(1) Tanks; or

(2) Infantry fighting vehicles.

*(b) Ground vehicles (not enumerated in paragraph (a) of this category) and trailers that are armed or are specially designed to be used as a firing or launch platform to deliver munitions or otherwise destroy or incapacitate targets (e.g., firing lasers, launching rockets, firing missiles, firing mortars, firing artillery rounds, or firing other ammunition greater than .50 caliber) (MT if specially designed for rockets, space launch vehicles, missiles, drones, or unmanned aerial vehicles capable of delivering a payload of at least 500 kg to a range of at least 300 km).

(c) Ground vehicles and trailers equipped with any mission systems controlled under this subchapter (MT if specially designed for rockets, space launch vehicles, missiles, drones, or unmanned aerial vehicles capable of delivering a payload of at least 500 kg to a range of at least 300 km).

NOTE TO PARAGRAPH (c): ''Mission systems'' are defined as ''systems'' (*see* §120.45(g) of this subchapter) that are defense articles that perform specific military functions, such as by providing military communication, target designation, surveillance, target detection, or sensor capabilities.

NOTE TO PARAGRAPHS (b) AND (c): ''Payload'' is the total mass that can be carried or delivered by the specified rocket, space launch vehicle, missile, drone, or unmanned aerial vehicle that is not used to maintain flight. For definition of ''range'' as it pertains to aircraft systems, *see* note to paragraph (a) USML Category VIII. For definition of ''range'' as it pertains to rocket systems, *see* note to paragraph (f)(6) of USML Category VI.

(d) [Reserved]

*(e) Armored support vehicles capable of off-road or amphibious use specially designed to transport or deploy personnel or materiel, or to move with other vehicles over land in close support of combat vehicles or troops (e.g., personnel carriers, resupply vehicles, combat engineer vehicles, recovery vehicles, reconnaissance vehicles, bridge launching vehicles, ambulances, and command and control vehicles).

(f) [Reserved]

(g) Ground vehicle parts, components, accessories, attachments, associated equipment, and systems as follows:

(1) Armored hulls, armored turrets, and turret rings;

(2) Active protection systems (*i.e.*, defensive systems that actively detect and track incoming threats and launch a ballistic, explosive, energy, or electromagnetic countermeasure(s) to neutralize the threat prior to contact with a vehicle) and specially designed parts and components therefor;

(3) Composite armor parts and components specially designed for the vehicles in this category;

(4) Spaced armor components and parts, including slat armor parts and components specially designed for the vehicles in this category;

(5) Reactive armor parts and components;

(6) Electromagnetic armor parts and components, including pulsed power specially designed parts and components therefor;

NOTE TO PARAGRAPHS (g)(3)–(6): *See* USML Category XIII(m)(1)–(4) for interpretations which explain and amplify terms used in these paragraphs.

(7) Built in test equipment (BITE) to evaluate the condition of weapons or other mission systems for vehicles identified in this category, excluding equipment that provides diagnostics solely for a subsystem or component involved in the basic operation of the vehicle;

(8) Gun mount, stabilization, turret drive, and automatic elevating systems, and specially designed parts and components therefor;

(9) Self-launching bridge components rated class 60 or above for deployment by vehicles in this category;

(10) Suspension components as follows:

(i) Rotary shock absorbers specially designed for the vehicles weighing more than 30 tons in this category; or

(ii) Torsion bars specially designed for the vehicles weighing more than 50 tons in this category;

(11) Kits specially designed to convert a vehicle in this category into either an unmanned or a driver-optional vehicle. For a kit to be controlled by this paragraph, it must, at a minimum, include equipment for:

(i) Remote or autonomous steering;

(ii) Acceleration and braking; and

(iii) A control system;

(12) Fire control computers, mission computers, vehicle management computers, integrated core processers, stores management systems, armaments control processors, vehicle-weapon interface units and computers;

(13) Test or calibration equipment for the mission systems of the vehicles in this category, except those enumerated elsewhere; or

*(14) Any part, component, accessory, attachment, equipment, or system that (MT for those articles designated as such):

(i) Is classified;

(ii) Contains classified software directly related to defense articles in this subchapter or 600 series items subject to the EAR; or

(iii) Is being developed using classified information.

''Classified'' means classified pursuant to Executive Order 13526, or predecessor order, and a security classification guide developed pursuant thereto or equivalent, or to the corresponding classification rules of another government or international organization.

NOTE TO PARAGRAPH (g): Parts, components, accessories, attachments, associated equipment, and systems specially designed for vehicles in this category but not listed in paragraph (g) are subject to the EAR under ECCN 0A606.

(h) Technical data (*see* §120.10 of this subchapter) and defense services (*see* §120.9 of this subchapter) directly related to the defense articles enumerated in paragraphs (a) through (g) of this category and classified technical data directly related to items controlled in ECCNs 0A606, 0B606, 0C606, and 0D606 and defense services using the classified technical data. (*See* §125.4 of this subchapter or exemptions.) (MT for technical data and defense services related to articles designated as such.)

(i)–(w) [Reserved]

(x) Commodities, software, and technical data subject to the EAR (*see* §120.42 of this

subchapter) used in or with defense articles controlled in this category.

NOTE TO PARAGRAPH (x): Use of this paragraph is limited to license applications for defense articles controlled in this category where the purchase documentation includes commodities, software, or technical data subject to the EAR (*see* §123.1(b) of this subchapter).

NOTE 1 TO CATEGORY VII: Ground vehicles specially designed for military applications that are not identified in this category are subject to the EAR under ECCN 0A606, including any unarmed ground vehicles, regardless of origin or designation, manufactured prior to 1956 and unmodified since 1955. Ground vehicles with modifications made to incorporate safety features required by law, are cosmetic (e.g., different paint, repositioning of bolt holes), or that add parts or components otherwise available prior to 1956 are considered ''unmodified'' for the purposes of this paragraph. ECCN 0A606 also includes unarmed vehicles derived from otherwise EAR99 civilian vehicles that have been modified or otherwise fitted with materials to provide ballistic protection, including protection to level III (National Institute of Justice Standard 0108.01, September 1985) or better and that do not have reactive or electromagnetic armor.

NOTE 2 TO CATEGORY VII: Armored ground vehicles are (i) ground vehicles that have integrated, fully armored hulls or cabs, or (ii) ground vehicles on which add-on armor has been installed to provide ballistic protection to level III (National Institute of Justice Standard 0108.01, September 1985) or better. Armored support vehicles do not include those that are merely capable of being equipped with add-on armor.

NOTE 3 TO CATEGORY VII: Ground vehicles include any vehicle meeting the definitions or control parameters regardless of the surface (e.g., highway, off-road, rail) upon which the vehicle is designed to operate.

### CATEGORY VIII—AIRCRAFT AND RELATED ARTICLES

(a) Aircraft, as follows:

*(1) Bombers;

*(2) Fighters, fighter bombers, and fixed-wing attack aircraft;

*(3) Turbofan- or turbojet-powered trainers used to train pilots for fighter, attack, or bomber aircraft;

*(4) Attack helicopters;

*(5) Unarmed military unmanned aerial vehicles (UAVs) (MT if the UAV has a range equal to or greater than 300km);

*(6) Armed unmanned aerial vehicles (UAVs) (MT if the UAV has a range equal to or greater than 300km);

*(7) Military intelligence, surveillance, and reconnaissance aircraft;

*(8) Electronic warfare, airborne warning and control aircraft;

(9) Air refueling aircraft;

(10) Target drones (MT if the drone has a range equal to or greater than 300km);

(11) Aircraft incorporating any mission system controlled under this subchapter;

NOTE 1 TO PARAGRAPH (a)(11): ''Mission systems'' are defined as ''systems'' (*see* §120.45(g) of this subchapter) that are defense articles that perform specific military functions such as by providing military communication, electronic warfare, target designation, surveillance, target detection, or sensor capabilities.

NOTE 2 TO PARAGRAPH (a)(11): This does not include tethered aerostats. Mission systems incorporated on otherwise EAR-controlled aerostats are controlled as the mission systems themselves just as if they were mounted, for example, on a tower or a pole.

(12) Aircraft capable of being refueled in flight including hover-in-flight refueling (HIFR);

*(13) Optionally Piloted Vehicles (OPV) (*i.e.*, aircraft specially designed to operate with and without a pilot physically located in the aircraft) (MT if the OPV has a range equal to or greater than 300km);

(14) Aircraft with a roll-on/roll-off ramp, capable of airlifting payloads over 35,000 lbs. to ranges over 2,000 nm without being refueled in-flight, and landing onto short or unimproved airfields;

*(15) Aircraft not enumerated in paragraphs (a)(1) through (a)(14) as follows:

(i) U.S.-origin aircraft that bear an original military designation of A, B, E, F, K, M, P, R, or S; or

(ii) Foreign-origin aircraft specially designed to provide functions equivalent to those of the aircraft listed in paragraph (a)(15)(i) of this category; or

(16) are armed or are specially designed to be used as a platform to deliver munitions or otherwise destroy targets (e.g., firing lasers, launching rockets, firing missiles, dropping bombs, or strafing);

NOTE 1 TO PARAGRAPH (a): Aircraft specially designed for military applications that are not identified in paragraph (a) of this section are subject to the EAR and classified as ECCN 9A610, including any unarmed military aircraft, regardless of origin or designation, manufactured prior to 1956 and unmodified since manufacture. Aircraft with modifications made to incorporate safety of flight features or other FAA or NTSB modifications such as transponders and air data recorders are considered ''unmodified'' for the purposes of this paragraph.

NOTE 2 TO PARAGRAPH (a): ''Range'' is the maximum distance that the specified aircraft system is capable of traveling in the mode of stable flight as measured by the projection of its trajectory over the surface of the Earth. The maximum capability based on

the design characteristics of the system, when fully loaded with fuel or propellant, will be taken into consideration in determining range. The range for aircraft systems will be determined independently of any external factors such as operational restrictions, limitations imposed by telemetry, data links, or other external constraints. For aircraft systems, the range will be determined for a one-way distance using the most fuel-efficient flight profile (e.g., cruise speed and altitude), assuming International Civil Aviation Organization (ICAO) standard atmosphere with zero wind.

(b)–(c) [Reserved]

(d) Ship-based launching and recovery equipment specially designed for defense articles described in paragraph (a) of this category and land-based variants thereof (MT if the ship-based launching and recovery equipment is for an unmanned aerial vehicle, drone, or missile that has a range equal to or greater than 300 km).

NOTE TO PARAGRAPH (d): Fixed land-based arresting gear is not included in this paragraph. For the definition of ''range,'' *see* note to paragraph (a) of this category.

*(e) Inertial navigation systems (INS), aided or hybrid inertial navigation systems, Inertial Measurement Units (IMUs), and Attitude and Heading Reference Systems (AHRS) specially designed for aircraft controlled in this category or controlled in ECCN 9A610 and all specially designed components, parts, and accessories therefor (MT if the INS, IMU, or AHRS is for an unmanned aerial vehicle, drone, or missile that has a ''range'' equal to or greater than 300 km). For other inertial reference systems and related components refer to USML Category XII(d).

(f) Developmental aircraft funded by the Department of Defense via contract or other funding authorization, and specially designed parts, components, accessories, and attachments therefor.

NOTE 1 TO PARAGRAPH (f): Paragraph (f) does not control aircraft and specially designed parts, components, accessories, and attachments therefor (a) in production; (b) determined to be subject to the EAR via a commodity jurisdiction determination (*see* §120.4 of this subchapter), or (c) identified in the relevant Department of Defense contract or other funding authorization as being developed for both civil and military applications.

NOTE 2 TO PARAGRAPH (f): Note 1 does not apply to defense articles enumerated on the U.S. Munitions List, whether in production or development.

NOTE 3 TO PARAGRAPH (f): This provision is applicable to those contracts or other funding authorizations that are dated April 16, 2014, or later.

(g) [Reserved]

(h) Aircraft parts, components, accessories, attachments, associated equipment and systems, as follows:

(1) Parts, components, accessories, attachments, and equipment specially designed for the following U.S.-origin aircraft: the B–1B, B–2, F–15SE, F/A–18 E/F/G, F–22, F–35 and future variants thereof; or the F–117 or U.S. Government technology demonstrators. Parts, components, accessories, attachments, and equipment of the F–15SE and F/A–18 E/F/G that are common to earlier models of these aircraft, unless listed in paragraph (h) of this category, are subject to the EAR;

NOTE TO PARAGRAPH (h)(1): Specially designed (*see* §120.4(b)(3)(ii) of this subchapter) does not control parts, components, accessories, and attachments that are common to aircraft described in paragraph (a) of this category but not identified in paragraph (h)(1), and those identified in paragraph (h)(1). For example, a part common to only the F–14 and F–35 is not specially designed for purposes of the ITAR. A part common to only the F–22 and F–35—two aircraft models identified in paragraph (h)(1)—is specially designed.

(2) Face gear gearboxes, split-torque gearboxes, variable speed gearboxes, synchronization shafts, interconnecting drive shafts, or rotorcraft gearboxes with internal pitch line velocities exceeding 20,000 feet per minute and able to operate 30 minutes with loss of lubrication, and specially designed parts and components therefor;

(3) Tail boom folding systems, stabilator folding systems or automatic rotor blade folding systems, and specially designed parts and components therefor;

(4) Wing folding systems, and specially designed parts and components therefor, for:

(i) Aircraft powered by power plants controlled under USML Category IV(d); or,

(ii) Aircraft powered by gas turbine engines with any of the following characteristics:

(A) The portion of the wing outboard of the wing fold is required for sustained flight;

(B) Fuel can be stored outboard of the wing fold;

(C) Control surfaces are outboard of the wing fold;

(D) Hard points are outboard of the wing fold;

(E) Hard points inboard of the wing fold are capable of in-flight ejection; or

(F) The aircraft is designed to withstand maximum vertical maneuvering accelerations greater than + 3.5g/−1.5g.

(5) Tail hooks and arresting gear, and specially designed parts and components therefor;

(6) Bomb racks, missile launchers, missile rails, weapon pylons, pylon-to-launcher adapters, unmanned aerial vehicle (UAV)

airborne launching systems, external stores support systems for ordnance or weapons, and specially designed parts and components therefor (MT if the bomb rack, missile launcher, missile rail, weapon pylon, pylon-to-launcher adapter, UAV airborne launching system, or external stores support system is for a UAV, drone, or missile that has a ''range'' equal to or greater than 300 km);

(7) Damage or failure-adaptive flight control systems specially designed for aircraft controlled in this category or controlled in ECCN 9A610;

(8) Threat-adaptive autonomous flight control systems;

(9) Non-surface-based flight control systems and effectors (e.g., thrust vectoring from gas ports other than main engine thrust vector);

(10) Radar altimeters with output power management or signal modulation (*i.e.*, frequency hopping, chirping, direct sequence-spectrum spreading) LPI (low probability of intercept) capabilities (MT if for an unmanned aerial vehicle, drone, or missile that has a ''range'' equal to or greater than 300 km);

(11) Air-to-air refueling systems and hover-in-flight refueling (HIFR) systems, and specially designed parts and components therefor;

(12) Unmanned aerial vehicle (UAV) flight control systems and vehicle management systems with swarming capability (*i.e.*, UAVs interact with each other to avoid collisions and stay together, or, if weaponized, coordinate targeting) (MT if for a UAV, drone or missile that has a ''range'' equal to or greater than 300 km);

(13) Aircraft Lithium-ion batteries that provide greater than 38VDC nominal;

(14) Lift fans, clutches, and roll posts for short take-off, vertical landing (STOVL) aircraft and specially designed parts and components for such lift fans and roll posts;

(15) Integrated helmets incorporating optical sights or slewing devices, which include the ability to aim, launch, track, or manage munitions (e.g., Helmet Mounted Cueing Systems, Joint Helmet Mounted Cueing Systems (JHMCS), Helmet Mounted Displays, Display and Sight Helmets (DASH)), and specially designed parts, components, accessories, and attachments therefor;

(16) Fire control computers, stores management systems, armaments control processors, aircraft-weapon interface units and computers (e.g., AGM–88 HARM Aircraft Launcher Interface Computer (ALIC));

(17) Mission computers, vehicle management computers, and integrated core processers specially designed for aircraft controlled in this category or controlled in ECCN 9A610;

(18) Drive systems and flight control systems specially designed to function after impact of a 7.62mm or larger projectile;

(19) Thrust reversers specially designed to be deployed in flight for aircraft controlled in this category or controlled in ECCN 9A610;

*(20) Any part, component, accessory, attachment, equipment, or system that:

(i) is classified;

(ii) contains classified software directly related to defense articles in this subchapter or 600 series items subject to the EAR; or

(iii) is being developed using classified information (*see* §120.10(a)(2) of this subchapter).

''Classified'' means classified pursuant to Executive Order 13526, or predecessor order, and a security classification guide developed pursuant thereto or equivalent, or to the corresponding classification rules of another government or international organization;

(21)–(22) [Reserved]

(23) Electricity-generating fuel cells specially designed for aircraft controlled in this category or controlled in ECCN 9A610;

(24) Thermal engines specially designed for aircraft controlled in this category or controlled in ECCN 9A610;

(25) Thermal batteries specially designed for aircraft controlled in this category or controlled in ECCN 9A610 (MT if the thermal battery is for an unmanned aerial vehicle, drone, or missile that has a ''range'' equal to or greater than 300 km); or

(26) Thermionic generators specially designed for aircraft controlled in this category or controlled in ECCN 9A610.

(i) Technical data (*see* §120.10 of this subchapter) and defense services (*see* §120.9 of this subchapter) directly related to the defense articles described in paragraphs (a) through (h) of this category and classified technical data directly related to items controlled in ECCNs 9A610, 9B610, 9C610, and 9D610 and defense services using classified technical data. (*See* §125.4 of this subchapter for exemptions.) (MT for technical data and defense services related to articles designated as such.)

(j)–(w) [Reserved]

(x) Commodities, software, and technical data subject to the EAR (*see* §120.42 of this subchapter) used in or with defense articles controlled in this category.

NOTE TO PARAGRAPH (x): Use of this paragraph is limited to license applications for defense articles controlled in this category where the purchase documentation includes commodities, software, or technical data subject to the EAR (*see* §123.1(b) of this subchapter).

NOTE: Inertial navigation systems, aided or hybrid inertial navigation systems, Inertial Measurement Units, and Attitude and Heading Reference Systems in paragraph (e) and parts, components, accessories, and attachments in paragraphs (h)(2)–(5), (7), (13), (14), (17)–(19), and (21)–(26) are licensed by the Department of Commerce when incorporated in a military aircraft subject to the EAR and

classified under ECCN 9A610. Replacement systems, parts, components, accessories and attachments are subject to the controls of the ITAR.

CATEGORY IX—MILITARY TRAINING EQUIPMENT AND TRAINING

(a) Training equipment, as follows:

(1) Ground, surface, submersible, space, or towed airborne targets that:

(i) Have an infrared, radar, acoustic, magnetic, or thermal signature that mimic a specific defense article, specific other item, or specific person; or

(ii) Are instrumented to provide hit/miss performance information for defense articles controlled in this subchapter;

NOTE TO PARAGRAPH (a)(1): Target drones are controlled in USML Category VIII(a).

(2) Devices that are mockups of articles enumerated in this subchapter used for maintenance training or disposal training for ordnance enumerated in this subchapter, that reveal technical data or contain parts, components, accessories, or attachments controlled in this subchapter;

(3) Air combat maneuvering instrumentation and ground stations therefor;

(4) Physiological flight trainers for fighter aircraft or attack helicopters;

(5) Radar trainers specially designed for training on radar controlled by USML Category XI;

(6) Training devices specially designed to be attached to a crew station, mission system, or weapon of an article controlled in this subchapter;

NOTE TO PARAGRAPH (a)(6): This paragraph includes stimulators that are built-in or add-on devices that cause the actual equipment to act as a trainer.

(7) Anti-submarine warfare trainers;

(8) Missile launch trainers;

(9) Radar target generators;

(10) Infrared scene generators; or

*(11) Any training device that:

(i) Is classified;

(ii) Contains classified software directly related to defense articles in this subchapter or 600 series items subject to the EAR; or

(iii) Is being developed using classified information.

NOTE TO PARAGRAPH (a)(11): ''Classified'' means classified pursuant to Executive Order 13526, or predecessor order, and a security classification guide developed pursuant thereto or equivalent, or to the corresponding classification rules of another government or international organization.''

NOTE TO PARAGRAPH (a): Training equipment does not include combat games without item signatures or tactics, techniques, and procedures covered by this subchapter.

(b) Simulators, as follows:

(1) System specific simulators that replicate the operation of an individual crew station, a mission system, or a weapon of an end-item that is controlled in this subchapter;

(2)–(3) [Reserved]

(4) Software and associated databases not elsewhere enumerated in this subchapter that can be used to model or simulate the following:

(i) Trainers enumerated in paragraph (a) of this category;

(ii) Battle management;

(iii) Military test scenarios/models; or

(iv) Effects of weapons enumerated in this subchapter; or

*(5) Simulators that:

(i) Are classified;

(ii) Contain classified software directly related to defense articles in this subchapter or 600 series items subject to the EAR; or

(iii) Are being developed using classified information.

NOTE TO PARAGRAPH (b)(5): ''Classified'' means classified pursuant to Executive Order 13526, or predecessor order, and a security classification guide developed pursuant thereto or equivalent, or to the corresponding classification rules of another government or international organization.

(c)–(d) [Reserved]

(e) Technical data (*see* §120.10 of this subchapter) and defense services (*see* §120.9 of this subchapter):

(1) Directly related to the defense articles enumerated in paragraphs (a) and (b) of this category;

(2) Directly related to the software and associated databases enumerated in paragraph (b)(4) of this category even if no defense articles are used or transferred; or

(3) Military training (*see*, §120.9(a)(3) of this subchapter) not directly related to defense articles or technical data enumerated in this subchapter.

(f)–(w) [Reserved]

(x) Commodities, software, and technical data subject to the EAR (*see* §120.42 of this subchapter) used in or with defense articles controlled in this category.

NOTE TO PARAGRAPH (x): Use of this paragraph is limited to license applications for defense articles controlled in this category where the purchase documentation includes commodities, software, or technical data subject to the EAR (*see* §123.1(b) of this subchapter).

NOTE TO USML CATEGORY IX: Parts, components, accessories, or attachments of a simulator in this category that are common to the simulated system or simulated end-item are controlled under the same USML category or CCL ECCN as the parts, components, accessories, and attachments of the simulated system or simulated end-item.

CATEGORY X—PERSONAL PROTECTIVE EQUIPMENT

(a) Personal protective equipment, as follows:

(1) Body armor providing a protection level equal to or greater than NIJ Type IV;

NOTE 1 TO PARAGRAPH (a)(1): For body armor providing a level of protection of Type I, Type II, Type IIA, Type IIIA, or Type III, *see* ECCNs 1A005 and 1A613.

NOTE 2 TO PARAGRAPH (a)(1): *See* USML Category XIII(e) for controls on related materials.

(2) Personal protective clothing, equipment, or face paints specially designed to protect against or reduce detection by radar, IR, or other sensors at wavelengths greater than 900 nanometers;

NOTE TO PARAGRAPH (a)(2): *See* USML Category XIII(j) for controls on related materials.

(3)–(4) [Reserved]

(5) Integrated helmets, not specified in USML Category VIII(h)(15) or USML Category XII, incorporating optical sights or slewing devices, which include the ability to aim, launch, track, or manage munitions;

(6) Helmets and helmet shells providing a protection level equal to or greater than NIJ Type IV;

(7) Goggles, spectacles, visors, vision blocks, canopies, or filters for optical sights or viewers, employing other than common broadband absorptive dyes or UV inhibitors as a means of protection (e.g., narrow band filters/dyes or broadband limiters/coatings with high visible transparency), having an optical density greater than 3, and that protect against:

(i) Multiple visible (in-band) laser wavelengths;

(ii) Thermal flashes associated with nuclear detonations; or

(iii) Near infrared or ultraviolet (out-of-band) laser wavelengths; or

NOTE 1 TO PARAGRAPH (a)(7): *See* paragraphs (d)(2) and (3) of this category for controls on related parts, components, and materials.

NOTE 2 TO PARAGRAPH (a)(7): *See* USML Category XII for sensor protection equipment.

(8) Developmental personal protective equipment and specially designed parts, components, accessories, and attachments therefor, developed for the U.S. Department of Defense via contract or other funding authorization.

NOTE 1 TO PARAGRAPH (a)(8): This paragraph does not control personal protective equipment and specially designed parts, components, accessories, and attachments (a) in production, (b) determined to be subject to the EAR via a commodity jurisdiction determination (*see* §120.4 of this subchapter), or (c) identified in the relevant Department of Defense contract or other funding authorization as being developed for both civil and military applications.

NOTE 2 TO PARAGRAPH (a)(8): Note 1 does not apply to defense articles enumerated on the USML, whether in production or development.

NOTE 3 TO PARAGRAPH (a)(8): This paragraph is applicable only to those contracts and funding authorizations that are dated January 5, 2015, or later.

(b)–(c) [Reserved]

(d) Parts, components, assemblies, accessories, attachments, and associated equipment for the personal protective equipment controlled in this category, as follows:

(1) Ceramic or composite plates that provide protection equal to or greater than NIJ Type IV;

(2) Lenses, substrates, or filters ''specially designed'' for the articles covered in paragraph (a)(7) of this category;

(3) Materials and coatings specially designed for the articles covered in paragraph (a)(7) of this category with optical density greater than 3, as follows:

(i) Narrowband absorbing dyes;

(ii) Broadband optical switches or limiters (*i.e.*, nonlinear material, tunable or switchable agile filters, optical power limiters, near infrared interference based filters); or

(iii) Narrowband interference based notch filters (*i.e.*, multi-layer dielectric coatings, rugate, holograms or hybrid (*i.e.*, interference with dye)) protecting against multiple laser wavelength and having high visible band transparency; or

*(4) Any component, part, accessory, attachment, equipment, or system that:

(i) Is classified;

(ii) Contains classified software directly related to defense articles in this subchapter or 600 series items subject to the EAR; or

(iii) Is being developed using classified information.

NOTE TO PARAGRAPH (d)(4): ''Classified'' means classified pursuant to Executive Order 13526, or predecessor order, and a security classification guide developed pursuant thereto or equivalent, or to the corresponding classification rules of another government or international government.

NOTE TO PARAGRAPHS (a) AND (d): *See* National Institute of Justice Classification, NIJ Standard-0101.06, or national equivalents, for a description of level of protection for armor.

(e) Technical data (*see* §120.10 of this subchapter) and defense services (*see* §120.9 of this subchapter) directly related to the defense articles described in paragraphs (a) through (d) of this category.

(f)–(w) [Reserved]

(x) Commodities, software, and technical data subject to the EAR (*see* §120.42 of this subchapter) used in or with defense articles controlled in this category.

NOTE TO PARAGRAPH (x): Use of this paragraph is limited to license applications for defense articles controlled in this category where the purchase documentation includes commodities, software, or technical data subject to the EAR (*see* §123.1(b) of this subchapter).

CATEGORY XI—MILITARY ELECTRONICS

(a) Electronic equipment and systems not included in Category XII of the U.S. Munitions List, as follows:

*(1) Underwater hardware, equipment, or systems, as follows:

(i) Active or passive acoustic array sensing systems or acoustic array equipment capable of real-time processing that survey or detect, and also track, localize (*i.e.*, determine range and bearing), classify, or identify, surface vessels, submarines, other undersea vehicles, torpedoes, or mines, having any of the following:

(A) Multi-static capability;

(B) Operating frequency less than 20 kHz; or

(C) Operating bandwidth greater than 10 kHz;

(ii) Underwater single acoustic sensor system that distinguishes non-biologic tonals and locates the origin of the sound;

*Note to paragraph(a)(1)(ii):* The term tonals implies discrete frequencies in the broadband and narrowband spectra, emanating from man-made objects.

(iii) Non-acoustic systems that survey or detect, and also track, localize (*i.e.*, determine range and bearing), classify, or identify, surface vessels, submarines, other undersea vehicles, torpedoes, or mines;

(iv) Acoustic modems, networks, and communications equipment with real-time adaptive compensation or employing Low Probability of Intercept (LPI);

*Note to paragraph (a)(1)(iv):* Adaptive compensation is the capability of an underwater modem to assess the water conditions to select the best algorithm to receive and transmit data.

(v) Low Frequency/Very Low Frequency (LF/VLF) electronic modems, routers, interfaces, and communications equipment, specially designed for submarine communications; or

(vi) Autonomous systems and equipment that enable cooperative sensing and engagement by fixed (bottom mounted/seabed) or mobile Autonomous Underwater Vehicles (AUVs);

*(2) Underwater acoustic countermeasures or counter-countermeasures systems or equipment;

*(3) Radar systems and equipment, as follows:

(i) Airborne radar that maintains positional state of an object or objects of interest, other than weather phenomena, in a received radar signal through time;

(ii) Synthetic Aperture Radar (SAR) incorporating image resolution less than (better than) 0.3 m, or incorporating Coherent Change Detection (CCD) with geo-registration accuracy less than (better than) 0.3 m, not including concealed object detection equipment operating in the frequency range from 30 GHz to 3,000 GHz and having a spatial resolution of 0.5 milliradians up to and including 1 milliradians at a standoff distance of 100 m;

(iii) Inverse Synthetic Aperture Radar (ISAR);

(iv) Radar that geodetically-locates (*i.e.*, geodetic latitude, geodetic longitude, and geodetic height) with a target location error 50 (TLE50) less than or equal to 10 m at ranges greater than 1 km;

(v) Any Ocean Surveillance Radar with an average-power-aperture product of greater than 50 $Wm^2$;

(vi) Any ocean surveillance radar that transmits a waveform with an instantaneous bandwidth greater than 100 MHz and has an antenna rotation rate greater than 60 revolutions per minute (RPM);

(vii) Air surveillance radar with free space detection of 1 square meter RCS target at 85 nmi or greater range, scaled to RCS values as RCS to the ¼ power;

(viii) Air surveillance radar with free space detection of 1 square meter RCS target at an altitude of 65,000 feet and an elevation angle greater than 20 degrees (*i.e.*, counter-battery);

(ix) Air surveillance radar with multiple elevation beams, phase or amplitude monopulse estimation, or 3D height-finding;

(x) Air surveillance radar with a beam solid angle less than or equal to 16 $degrees^2$ that performs free space tracking of 1 square meter RCS target at a range greater or equal to 25 nmi with revisit rate greater or equal to ⅓ Hz;

(xi) Instrumentation radar for anechoic test facility or outdoor range that maintains positional state of an object of interest in a received radar signal through time or provides measurement of RCS of a static target less than or equal to minus 10dBsm, or RCS of a dynamic target;

(xii) Radar incorporating pulsed operation with electronics steering of transmit beam in elevation and azimuth;

NOTE TO PARAGRAPH (a)(3)(xii): This paragraph does not control radars not otherwise controlled in this subchapter, operating with a peak transmit power less than or equal to 250 watts, and employing a design determined to be subject to the EAR via a commodity jurisdiction determination (*see* §120.4 of this subchapter).

(xiii) Radar with mode(s) for ballistic tracking or ballistic extrapolation to source of launch or impact point of articles controlled in USML Categories III, IV, or XV;

(xiv) Active protection radar and missile warning radar with mode(s) implemented for detection of incoming munitions;

(xv) Over the horizon high frequency skywave (ionosphere) radar;

(xvi) Radar that detects a moving object through a physical obstruction at distance greater than 0.2 m from the obstruction;

(xvii) Radar having moving target indicator (MTI) or pulse-Doppler processing where any single Doppler filter provides a normalized clutter attenuation of greater than 60dB;

*Note to paragraph (a)(3)(xvii):* Normalized clutter attenuation is defined as the reduction in the power level of received distributed clutter when normalized to the thermal noise level.

(xviii) Radar having electronic protection or electronic counter-countermeasures (ECCM) other than manual gain control, automatic gain control, radio frequency selection, constant false alarm rate, and pulse repetition interval jitter;

(xix) Radar employing electronic attack (EA) mode(s) using the radar transmitter and antenna;

(xx) Radar employing electronic support (ES) mode(s) (*i.e.,* the ability to use a radar system for ES purposes in one or more of the following: as a high-gain receiver, as a wide-bandwidth receiver, as a multi-beam receiver, or as part of a multi-point system);

(xxi) Radar employing non-cooperative target recognition (NCTR) (*i.e.,* the ability to recognize a specific platform type without cooperative action of the target platform);

NOTE TO PARAGRAPH (a)(3)(xxi): The definition of ''type'' in this paragraph is that provided in 14 CFR §1.1.

(xxii) Radar employing automatic target recognition (ATR) (*i.e.,* recognition of target using structural features (e.g., tank versus car) of the target with system resolution better than (less than) 0.3 m);

(xxiii) Radar that sends interceptor guidance commands or provides illumination keyed to an interceptor seeker;

(xxiv) Radar employing waveform generation for LPI other than frequency modulated continuous wave (FMCW) with linear ramp modulation;

(xxv) Radar that sends and receives communications;

(xxvi) Radar that tracks or discriminates ballistic missile warhead from debris or countermeasures;

(xxvii) Bi-static/multi-static radar that exploits greater than 125 kHz bandwidth and is lower than 2 GHz center frequency to passively detect or track using radio frequency (RF) transmissions (e.g., commercial radio, television stations);

(xxviii) Radar target generators, projectors, or simulators, specially designed for radars controlled by this category; or

(xxix) Radar and laser radar systems specially designed for defense articles in paragraph (a)(1) of USML Category IV or paragraphs (a)(5), (a)(6), or (a)(13) of USML Category VIII (MT if specially designed for rockets, space launch vehicles, missiles, drones, or unmanned aerial vehicles capable of delivering a payload of at least 500 kg to a range of at least 300 km);

NOTE 1 TO PARAGRAPH (a)(3)(xxix): Laser radar systems embody specialized transmission, scanning, receiving, and signal processing techniques for utilization of lasers for echo ranging, direction finding, and discrimination of targets by location, radial speed, and body reflection characteristics.

NOTE 2 TO PARAGRAPH (a)(3)(xxix): For definition of ''range'' as it pertains to rocket systems, *see* note 1 to paragraph (a) of USML Category IV. ''Payload'' is the total mass that can be carried or delivered by the specified rocket, SLV, or missile that is not used to maintain flight.

NOTE TO PARAGRAPH (a)(3): This paragraph does not control: (a) Systems or equipment that require aircraft transponders in order to meet control parameters; (b) precision approach radar (PAR) equipment conforming to ICAO standards and employing electronically steerable linear (1- dimensional) arrays or mechanically positioned passive antennas; and (c) radio altimeter equipment conforming to FAA TSO C87.

*(4) Electronic Combat (*i.e.,* Electronic Warfare) systems and equipment, as follows:

(i) ES systems and equipment that search for, intercept and identify, or locate sources of intentional or unintentional electromagnetic energy specially designed to provide immediate threat detection, recognition, targeting, planning, or conduct of future operations;

NOTE TO PARAGRAPH (a)(4)(i): ES provides tactical situational awareness, automatic cueing, targeting, electronic order of battle planning, electronic intelligence (ELINT), communication intelligence (COMINT), or signals intelligence (SIGINT).

(ii) Systems and equipment that detect and automatically discriminate acoustic energy emanating from weapons fire (e.g., gunfire, artillery, rocket propelled grenades, or other projectiles), determining location or direction of weapons fire in less than two seconds from receipt of event signal, and able to operate on-the-move (e.g., operating on personnel, land vehicles, sea vessels, or aircraft while in motion); or

(iii) Systems and equipment specially designed to introduce extraneous or erroneous signals into radar, infrared based seekers, electro-optic based seekers, radio communication receivers, navigation receivers, or

that otherwise hinder the reception, operation, or effectiveness of adversary electronics (e.g., active or passive electronic attack, electronic countermeasure, electronic counter-countermeasure equipment, jamming, and counter jamming equipment);

*(5) Command, control, and communications (C3); command, control, communications, and computers (C4); command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR); and identification systems or equipment, that:

(i) Are specially designed to integrate, incorporate, network, or employ defense articles that are controlled in paragraphs or subparagraphs of the categories of §121.1 of this part that do not use the term specially designed;

(ii) Incorporate U.S. government identification friend or foe (IFF) Modes 4 or 5;

(iii) Implement active or passive ECCM used to counter acts of communication disruption (e.g., radios that incorporate HAVE QUICK I/II, SINCGARS, SATURN);

(iv) Specially designed, rated, certified, or otherwise specified or described to be in compliance with U.S. government NSTISSAM TEMPEST 1–92 standards or CNSSAM TEMPEST 01–02, to implement techniques to suppress compromising emanations of information bearing signals; or

(v) Transmit voice or data signals specially designed to elude electromagnetic detection;

(6) [Reserved]

(7) Developmental electronic equipment or systems funded by the Department of Defense via contract or other funding authorization;

NOTE 1 TO PARAGRAPH (a)(7): This paragraph does not control electronic systems or equipment (a) in production, (b) determined to be subject to the EAR via a commodity jurisdiction determination (*see* §120.4 of this subchapter), or (c) identified in the relevant Department of Defense contract or other funding authorization as being developed for both civil and military applications.

NOTE 2 TO PARAGRAPH (a)(7): Note 1 does not apply to defense articles enumerated on the USML, whether in production or development.

NOTE 3 TO PARAGRAPH (a)(7): This paragraph is applicable only to those contracts and funding authorizations that are dated July 1, 2015, or later.

(8) Unattended ground sensor (UGS) systems or equipment having all of the following:

(i) Automatic target detection;

(ii) Automatic target tracking, classification, recognition, or identification;

(iii) Self-forming or self-healing networks; and

(iv) Self-localization for geo-locating targets;

(9) Electronic sensor systems or equipment for non-acoustic antisubmarine warfare (ASW) or mine warfare (e.g., magnetic anomaly detectors (MAD), electric-field, electromagnetic induction);

(10) Electronic sensor systems or equipment for detection of concealed weapons, having a standoff detection range of greater than 45 m for personnel or detection of vehicle-carried weapons, not including concealed object detection equipment operating in the frequency range from 30 GHz to 3,000 GHz and having a spatial resolution of 0.5 milliradians up to and including 1 milliradians at a standoff distance of 100 m;

(11) Test sets specially designed for testing defense articles controlled in paragraphs (a)(3), (a)(4), (a)(5), or (b); or

(12) Direction finding equipment for determining bearings to specific electromagnetic sources or terrain characteristics specially designed for defense articles in paragraph (a)(1) of USML Category IV or paragraphs (a)(5), (a)(6), or (a)(13) of USML Category VIII (MT if specially designed for rockets, SLVs, missiles, drones, or UAVs capable of delivering a payload of at least 500 kg to a range of at least 300 km. *See* note 2 to paragraph (a)(3)(xxix) of this category).

NOTE 1 TO PARAGRAPH (a): The term Low Probability of Intercept used in this paragraph and elsewhere in this category is defined as a class of measures that disguise, delay, or prevent the interception of acoustic or electromagnetic signals. LPI techniques can involve permutations of power management, energy management, frequency variability, out-of-receiver-frequency band, low-side lobe antenna, complex waveforms, and complex scanning. LPI is also referred to as Low Probability of Intercept, Low Probability of Detection, and Low Probability of Identification.

NOTE 2 TO PARAGRAPH (a): Paragraphs (a)(3)(xxix) and (a)(12) include terrain contour mapping equipment, scene mapping and correlation (both digital and analogue) equipment, Doppler navigation radar equipment, passive interferometer equipment, and imaging sensor equipment (both active and passive).

*(b) Electronic systems, equipment or software, not elsewhere enumerated in this subchapter, specially designed for intelligence purposes that collect, survey, monitor, or exploit, or analyze and produce information from, the electromagnetic spectrum (regardless of transmission medium), or for counteracting such activities.

(c) Parts, components, accessories, attachments, and associated equipment, as follows:

(1) Application Specific Integrated Circuits (ASICs) and Programmable Logic Devices (PLD) programmed for defense articles in this subchapter;

NOTE 1 TO PARAGRAPH (c)(1):\ An ASIC is an integrated circuit developed and produced for a specific application or function regardless of number of customers.

NOTE 2 TO PARAGRAPH (c)(1): ASICs and PLDs programmed for 600 series items are controlled in ECCN 3A611.f.

NOTE 3 TO PARAGRAPH (c)(1): Unprogrammed PLDs are not controlled by this paragraph.

(2) Printed Circuit Boards (PCBs) and populated circuit card assemblies for which the layout is specially designed for defense articles in this subchapter;

NOTE TO PARAGRAPH (c)(2): PCBs and populated circuit card assemblies for which the layout is specially designed for 600 series items are controlled in ECCN 3A611.g.

(3) Multichip modules for which the pattern or layout is specially designed for defense articles in this subchapter;

NOTE TO PARAGRAPH (c)(3): Multichip modules for which the pattern or layout is specially designed for 600 series items are controlled in ECCN 3A611.h.

(4) Transmit/receive modules or transmit modules that have any two perpendicular sides, with either length d (in cm) equal to or less than 15 divided by the lowest operating frequency in GHz [d≤15cm*GHz/fGHz], with an electronically variable phase shifter or phasers that are a Monolithic Microwave Integrated Circuit (MMIC), or incorporate a MMIC or discrete RF power transistor;

(5) High-energy storage capacitors with a repetition rate of 6 discharges or more per minute and full energy life greater than or equal to 10,000 discharges, at greater than 0.2 Amps per Joule peak current, that have any of the following:

(i) Volumetric energy density greater than or equal to 1.5 J/cc; or

(ii) Mass energy density greater than or equal to 1.3 kJ/kg;

(6) Radio frequency circulators of any dimension equal to or less than one quarter (¼) wavelength of the highest operating frequency and isolation greater than 30 dB;

(7) Polarimeter that detects and measures polarization of radio frequency signals within a single pulse;

(8) Digital radio frequency memory (DRFM) with RF instantaneous input bandwidth greater than 400 MHz, and 4 bit or higher resolution whose output signal is a translation of the input signal (e.g., changes in magnitude, time, frequency) and specially designed parts and components therefor;

(9) Vacuum electronic devices, as follows:

(i) Multiple electron beam or sheet electron beam devices rated for operation at frequencies of 16 GHz or above, and with a saturated power output greater than 10,000 W (70 dBm) or a maximum average power output greater than 3,000 W (65 dBm); or

(ii) Cross-field amplifiers with a gain of 15 dB to 17 dB or a duty factor greater than 5%;

(10) Antenna, and specially designed parts and components therefor, that:

(i) Employ four or more elements, electronically steer angular beams, independently steer angular nulls, create angular nulls with a null depth greater than 20 dB, and achieve a beam switching speed faster than 50 milliseconds;

(ii) Form adaptive null attenuation greater than 35 dB with convergence time less than one second;

(iii) Detect signals across multiple RF bands with matched left hand and right hand spiral antenna elements for determination of signal polarization; or

(iv) Determine signal angle of arrival less than two degrees (e.g., interferometer antenna);

NOTE TO PARAGRAPH (c)(10): This category does not control Traffic Collision Avoidance Systems (TCAS) equipment conforming to FAA TSO C–119c.

(11) Radomes or electromagnetic antenna windows that:

(i) Incorporate radio frequency selective surfaces;

(ii) Operate in multiple non-adjacent frequency bands for radar applications;

(iii) Incorporate a structure that is specially designed to provide ballistic protection from bullets, shrapnel, or blast;

(iv) Have a melting point greater than 1,300 °C and maintain a dielectric constant less than 6 at temperatures greater than 500 °C;

(v) Are manufactured from ceramic materials with a dielectric constant less than 6 at any frequency from 100 MHz to 100 GHz (MT if usable in rockets, SLVs, or missiles capable of achieving a range greater than or equal to 300 km; or if usable in drones or UAVs capable of delivering a payload of at least 500 kg to a range of at least 300 km. *See* note 2 to paragraph (a)(3)(xxix) of this category);

(vi) Maintain structural integrity at stagnation pressures greater than 6,000 pounds per square foot; or

(vii) Withstand combined thermal shock greater than $4.184 \times 10^6$ J/m$^2$ accompanied by a peak overpressure of greater than 50 kPa (MT if usable in rockets, SLVs, missiles, drones, or UAVs capable of delivering a payload of at least 500 kg to a range of at least 300 km and usable in protecting against nuclear effects (e.g., Electromagnetic Pulse (EMP), X-rays, combined blast and thermal effects). *See* note 2 to paragraph (a)(3)(xxix) of this category);

(12) Underwater sensors (acoustic vector sensors, hydrophones, or transducers) or projectors, specially designed for systems controlled by paragraphs (a)(1) and (a)(2) of this category, having any of the following:

(i) A transmitting frequency below 10 kHz for sonar systems;
(ii) Sound pressure level exceeding 224 dB (reference 1 mPa at 1 m) for equipment with an operating frequency in the band from 10 kHz to 24 kHz inclusive;
(iii) Sound pressure level exceeding 235 dB (reference 1 mPa at 1 m) for equipment with an operating frequency in the band between 24 kHz and 30 kHz;
(iv) Forming beams of less than 1° on any axis and having an operating frequency of less than 100 kHz;
(v) Designed to operate with an unambiguous display range exceeding 5,120 m; or
(vi) Designed to withstand pressure during normal operation at depths exceeding 1,000 m and having transducers with any of the following:
(A) Dynamic compensation for pressure; or
(B) Incorporating other than lead zirconate titanate as the transduction element;
(13) Parts or components containing piezoelectric materials which are specially designed for underwater hardware, equipment, or systems controlled by paragraph (c)(12) of this category;
(14) Tuners specially designed for systems and equipment in paragraphs (a)(4) and (b) of this category;
(15) Electronic assemblies and components, capable of operation at temperatures in excess of 125 °C and specially designed for UAVs or drones controlled by USML Category VIII, rockets, space launch vehicles (SLV), or missiles controlled by USML Category IV capable of achieving a range greater than or equal to 300 km (MT) (*see* Note 2 to paragraph (a)(3)(xxix) of this category);
(16) Hybrid (combined analogue/digital) computers specially designed for modeling, simulation, or design integration of systems enumerated in paragraphs (a)(1), (d)(1), (d)(2), (h)(1), (h)(2), (h)(4), (h)(8), and (h)(9) of USML Category IV or paragraphs (a)(5), (a)(6), or (a)(13) of USML Category VIII (MT if for rockets, SLVs, missiles, drones, or UAVs capable of delivering a payload of at least 500 kg to a range of at least 300 km or their subsystems. *See* note 2 to paragraph (a)(3)(xxix) of this category);
(17) Chaff and flare rounds specially designed for the systems and equipment described in paragraph (a)(4)(iii) of this category, and parts and components therefor containing materials controlled in USML Category V;
(18) Parts, components, or accessories specially designed for an information assurance/information security system or radio controlled in this subchapter that modify its published properties (e.g., frequency range, algorithms, waveforms, CODECs, or modulation/demodulation schemes); or
*(19) Any part, component, accessory, attachment, equipment, or system that (MT for those articles designated as such):
(i) Is classified;
(ii) Contains classified software directly related to defense articles in this subchapter or 600 series items subject to the EAR; or
(iii) Is being developed using classified information (*see* §120.10(a)(2) of this subchapter).

NOTE TO PARAGRAPH (c)(19): ''Classified'' means classified pursuant to Executive Order 13526, or predecessor order, and a security classification guide developed pursuant thereto or equivalent, or to the corresponding classification rules of another government or international organization.

NOTE TO PARAGRAPH (c)(19)(ii): Parts and components controlled by this paragraph are limited to those that store, process, or transmit classified software (*see* §121.8(f) of this subchapter).

(d) Technical data (*see* §120.10 of this subchapter) and defense services (*see* §120.9 of this subchapter) directly related to the defense articles described in paragraphs (a) through (c) of this category and classified technical data directly related to items controlled in CCL ECCNs 3A611, 3B611, 3C611, and 3D611 and defense services using the classified technical data. (*See* §125.4 of this subchapter for exemptions.) (MT for technical data and defense services related to articles designated as such.)
(e)–(w) [Reserved];
(x) Commodities, software, and technology subject to the EAR (*see* §120.42 of this subchapter) used in or with defense articles controlled in this category.

NOTE TO PARAGRAPH (x): Use of this paragraph is limited to license applications for defense articles controlled in this category where the purchase documentation includes commodities, software, or technology subject to the EAR (*see* §123.1(b) of this subchapter).

CATEGORY XII—FIRE CONTROL, RANGE FINDER, OPTICAL AND GUIDANCE AND CONTROL EQUIPMENT

*(a) Fire control systems; gun and missile tracking and guidance systems; gun range, position, height finders, spotting instruments and laying equipment; aiming devices (electronic, optic, and acoustic); bomb sights, bombing computers, military television sighting and viewing units, and periscopes for the articles of this section.
*(b) Lasers specifically designed, modified or configured for military application including those used in military communication devices, target designators and range finders, target detection systems, and directed energy weapons.
*(c) Infrared focal plane array detectors specifically designed, modified, or configured for military use; image intensification and other night sighting equipment or systems specifically designed, modified or configured

for military use; second generation and above military image intensification tubes (defined below) specifically designed, developed, modified, or configured for military use, and infrared, visible and ultraviolet devices specifically designed, developed, modified, or configured for military application. Military second and third generation image intensification tubes and military infrared focal plane arrays identified in this subparagraph are licensed by the Department of Commerce (ECCN 6A002A and 6A003A)) when part of a commercial system (*i.e.*, those systems originally designed for commercial use). This does not include any military system comprised of non-military specification components. Replacement tubes or focal plane arrays identified in this paragraph being exported for commercial systems are subject to the controls of the ITAR.

NOTE: *Special definition.* For purposes of this subparagraph, *second and third generation image intensification tubes* are defined as having: A peak response within the 0.4 to 1.05 micron wavelength range and incorporating a microchannel plate for electron image amplification having a hole pitch (center-to-center spacing) of less than 25 microns and having either:

(a) An S–20, S–25 or multialkali photocathode; or

(b) A GaAs, GaInAs, or other compound semiconductor photocathode.

*(d) Inertial platforms and sensors for weapons or weapon systems; guidance, control and stabilization systems except for those systems covered in Category VIII; astro-compasses and star trackers and military accelerometers and gyros. For aircraft inertial reference systems and related components refer to Category VIII.

(e) Components, parts, accessories, attachments and associated equipment specifically designed or modified for the articles in paragraphs (a) through (d) of this category, except for such items as are in normal commercial use.

(f) Technical data (as defined in §120.10) and defense services (as defined in §120.9) directly related to the defense articles described in paragraphs (a) through (e) of this category. (See §125.4 for exemptions.) Technical data directly related to manufacture and production of any defense articles described elsewhere in this category that are designated as Significant Military Equipment (SME) shall itself be designated as SME.

### CATEGORY XIII— MATERIALS AND MISCELLANEOUS ARTICLES

(a) Cameras and specialized processing equipment therefor, photointerpretation, stereoscopic plotting, and photogrammetry equipment which are specifically designed, developed, modified, adapted, or configured for military purposes, and components specifically designed or modified therefor.

(b) Information security or information assurance systems and equipment, cryptographic devices, software, and components, as follows:

(1) Military or intelligence cryptographic (including key management) systems, equipment, assemblies, modules, integrated circuits, components, and software (including their cryptographic interfaces) capable of maintaining secrecy or confidentiality of information or information systems, including equipment or software for tracking, telemetry, and control (TT&C) encryption and decryption;

(2) Military or intelligence cryptographic (including key management) systems, equipment, assemblies, modules, integrated circuits, components, and software (including their cryptographic interfaces) capable of generating spreading or hopping codes for spread spectrum systems or equipment;

(3) Military or intelligence cryptanalytic systems, equipment, assemblies, modules, integrated circuits, components and software;

(4) Military or intelligence systems, equipment, assemblies, modules, integrated circuits, components, or software (including all previous or derived versions) authorized to control access to or transfer data between different security domains as listed on the Unified Cross Domain Management Office (UCDMO) Control List (UCL); or

(5) Ancillary equipment specially designed for the articles in paragraphs (b)(1)–(b)(4) of this category.

(c) [Reserved]

(d) Materials, as follows:

*(1) Ablative materials fabricated or semi-fabricated from advanced composites (e.g., silica, graphite, carbon, carbon/carbon, and boron filaments) specially designed for the articles in USML Category IV or XV (MT if usable for nozzles, re-entry vehicles, nose tips, or nozzle flaps usable in rockets, space launch vehicles (SLVs), or missiles capable of achieving a range greater than or equal to 300 km); or

(2) Carbon/carbon billets and preforms that are reinforced with continuous unidirectional fibers, tows, tapes, or woven cloths in three or more dimensional planes (MT if designed for rocket, SLV, or missile systems and usable in rockets, SLVs, or missiles capable of achieving a range greater than or equal to 300 km).

NOTE TO PARAGRAPH (d): ''Range'' is the maximum distance that the specified rocket system is capable of traveling in the mode of stable flight as measured by the projection of its trajectory over the surface of the Earth. The maximum capability based on the design characteristics of the system, when fully loaded with fuel or propellant, will be taken into consideration in determining range. The range for rocket systems will be

determined independently of any external factors such as operational restrictions, limitations imposed by telemetry, data links, or other external constraints. For rocket systems, the range will be determined using the trajectory that maximizes range, assuming International Civil Aviation Organization (ICAO) standard atmosphere with zero wind.

NOTE TO PARAGRAPH (d)(2): This paragraph does not control carbon/carbon billets and preforms where reinforcement in the third dimension is limited to interlocking of adjacent layers only.

(e) Armor (e.g., organic, ceramic, metallic) and armor materials, as follows:

(1) Spaced armor with $E_m$ greater than 1.4 and meeting NIJ Level III or better;

(2) Transparent armor having $E_m$ greater than or equal to 1.3 or having $E_m$ less than 1.3 and meeting and exceeding NIJ Level III standards with areal density less than or equal to 40 pounds per square foot;

(3) Transparent ceramic plate greater than ¼ inch-thick and larger than 8 inches × 8 inches, excluding glass, for transparent armor;

(4) Non-transparent ceramic plate or blanks, greater than ¼ inches thick and larger than 8 inches × 8 inches for transparent armor. This includes spinel and aluminum oxynitride (ALON);

(5) Composite armor with $E_m$ greater than 1.4 and meeting or exceeding NIJ Level III;

(6) Metal laminate armor with $E_m$ greater than 1.4 and meeting or exceeding NIJ Level III; or

(7) Developmental armor funded by the Department of Defense via contract or other funding authorization.

NOTE 1 TO PARAGRAPH (e)(7): This paragraph does not control armor (a) in production, (b) determined to be subject to the EAR via a commodity jurisdiction determination (*see* §120.4 of this subchapter), or (c) identified in the relevant Department of Defense contract or other funding authorization as being developed for both civil and military applications.

NOTE 2 TO PARAGRAPH (e)(7): Note 1 does not apply to defense articles enumerated on the USML, whether in production or development.

NOTE 3 TO PARAGRAPH (e)(7): This provision is applicable to those contracts and funding authorizations that are dated July 8, 2014, or later.

*(f) Any article enumerated in this category that (MT for those articles designated as such):

(i) Is classified;

(ii) Contains classified software directly related to defense articles in this subchapter or 600 series items subject to the EAR; or

(iii) Is being developed using classified information.

''Classified'' means classified pursuant to Executive Order 13526, or predecessor order, and a security classification guide developed pursuant thereto or equivalent, or to the corresponding classification rules of another government or international organization.

*(g) Concealment and deception equipment, as follows (MT for applications usable for rockets, SLVs, missiles, drones, or unmanned aerial vehicles (UAVs) capable of achieving a range greater than or equal to 300 km and their subsystems. *See* note to paragraph (d) of this category):

(1) Polymers loaded with carbonyl iron powder, ferrites, iron whiskers, fibers, flakes, or other magnetic additives having a surface resistivity of less than 5000 ohms/square and greater than 10 ohms/square with electrical isotropy of less than 5%;

(2) Multi-layer camouflage systems specially designed to reduce detection of platforms or equipment in the infrared or ultraviolet frequency spectrums;

(3) High temperature (greater than 300 °F operation) ceramic or magnetic radar absorbing material (RAM) specially designed for use on defense articles or military items subject to the EAR; or

(4) Broadband (greater than 30% bandwidth) lightweight (less than 2 lbs/sq ft) magnetic radar absorbing material (RAM) specially designed for use on defense articles or military items subject to the EAR.

(h) Energy conversion devices not otherwise enumerated in this subchapter, as follows:

(1) Fuel cells specially designed for platforms or soldier systems specified in this subchapter;

(2) Thermal engines specially designed for platforms or soldier systems specified in this subchapter;

(3) Thermal batteries (MT if designed or modified for rockets, SLVs, missiles, drones, or UAVs capable of achieving a range equal to or greater than 300 km. *See* note to paragraph (d) of this category); or

NOTE TO PARAGRAPH (h)(3): Thermal batteries are single use batteries that contain a solid non-conducting inorganic salt as the electrolyte. These batteries incorporate a pyrolitic material that, when ignited, melts the electrolyte and activates the battery.

(4) Thermionic generators specially designed for platforms or soldier systems enumerated in this subchapter.

*(i) Signature reduction software, and technical data as follows (MT for software specially designed for reduced observables, for applications usable for rockets, SLVs, missiles, drones, or UAVs capable of achieving a range (*see* note to paragraph (d) of this category) greater than or equal to 300 km, and their subsystems, including software specially designed for analysis of signature

reduction; MT for technical data for the development, production, or use of equipment, materials, or software designated as such, including databases specially designed for analysis of signature reduction):

(1) Software associated with the measurement or modification of system signatures for defense articles to reduce detectability or observability;

(2) Software for design of low-observable platforms;

(3) Software for design, analysis, prediction, or optimization of signature management solutions for defense articles;

(4) Infrared signature measurement or prediction software for defense articles or radar cross section measurement or prediction software;

(5) Signature management technical data, including codes and algorithms for defense articles to reduce detectability or observability;

(6) Signature control design methodology (*see* §125.4(c)(4) of this subchapter) for defense articles to reduce detectability or observability;

(7) Technical data for use of micro-encapsulation or micro-spheres to reduce infrared, radar, or visual detection of platforms or equipment;

(8) Multi-layer camouflage system technical data for reducing detection of platforms or equipment;

(9) Multi-spectral surface treatment technical data for modifying infrared, visual or radio frequency signatures of platforms or equipment;

(10) Technical data for modifying visual, electro-optical, radiofrequency, electric, magnetic, electromagnetic, or wake signatures (e.g., low probability of intercept (LPI) techniques, methods or applications) of defense platforms or equipment through shaping, active, or passive techniques; or

(11) Technical data for modifying acoustic signatures of defense platforms or equipment through shaping, active, or passive techniques.

(j) Equipment, materials, coatings, and treatments not elsewhere specified, as follows:

(1) Specially treated or formulated dyes, coatings, and fabrics used in the design, manufacture, or production of personnel protective clothing, equipment, or face paints designed to protect against or reduce detection by radar, infrared, or other sensors at wavelengths greater than 900 nanometers (*see* USML Category X(a)(2)); or

*(2) Equipment, materials, coatings, and treatments that are specially designed to modify the electro-optical, radiofrequency, infrared, electric, laser, magnetic, electromagnetic, acoustic, electro-static, or wake signatures of defense articles or 600 series items subject to the EAR through control of absorption, reflection, or emission to reduce detectability or observability (MT for applications usable for rockets, SLVs, missiles, drones, or UAVs capable of achieving a range greater than or equal to 300 km, and their subsystems. *See* note to paragraph (d) of this category).

*(k) Tooling and equipment, as follows:

(1) Tooling and equipment specially designed for production of low observable (LO) components; or

(2) Portable platform signature field repair validation equipment (e.g., portable optical interrogator that validates integrity of a repair to a signature reduction structure).

(l) Technical data (*see* §120.10 of this subchapter) directly related to the defense articles described in paragraphs (a) through (h), (j), and (k) of this category and defense services (*see* §120.9 of this subchapter) directly related to the defense articles described in this category. (*See* also §123.20 of this subchapter.) (MT for technical data and defense services related to articles designated as such.)

(m) The following interpretations explain and amplify terms used in this category and elsewhere in this subchapter:

(1) Composite armor is defined as having more than one layer of different materials or a matrix.

(2) Spaced armors are metallic or non-metallic armors that incorporate an air space or obliquity or discontinuous material path effects as part of the defeat mechanism.

(3) Reactive armor employs explosives, propellants, or other materials between plates for the purpose of enhancing plate motion during a ballistic event or otherwise defeating the penetrator.

(4) Electromagnetic armor (EMA) employs electricity to defeat threats such as shaped charges.

(5) Materials used in composite armor could include layers of metals, plastics, elastomers, fibers, glass, ceramics, ceramic-glass reinforced plastic laminates, encapsulated ceramics in a metallic or non-metallic matrix, functionally gradient ceramic-metal materials, or ceramic balls in a cast metal matrix.

(6) For this category, a material is considered transparent if it allows 75% or greater transmission of light, corrected for index of refraction, in the visible spectrum through a 1 mm thick nominal sample.

(7) The material controlled in paragraph (e)(4) of this category has not been treated to reach the 75% transmission level referenced in (m)(6) of this category.

(8) Metal laminate armors are two or more layers of metallic materials which are mechanically or adhesively bonded together to form an armor system.

(9) $E_m$ is the line-of-sight target mass effectiveness ratio and provides a measure of the tested armor's performance to that of rolled

homogenous armor, where $E_m$ is defined as follows:

$$Em = \frac{\rho_{RHA}\left(P_o - P_r\right)}{AD_{T\,\mathrm{arg}\,et}}$$

Where:

$\rho_{RHA}$ = density of RHA, (7.85 g/cm$^3$)
Po = Baseline Penetration of RHA, (mm)
Pr = Residual Line of Sight Penetration, either positive or negative (mm RHA equivalent)
$AD_{TARGET}$ = Line-of-Sight Areal Density of Target (kg/m$^2$)

If witness plate is penetrated, $P_r$ is the distance from the projectile to the front edge of the witness plate. If not penetrated, $P_r$ is negative and is the distance from the back edge of the target to the projectile.

(10) NIJ is the National Institute of Justice and Level III refers to the requirements specified in NIJ standard 0108.01 Ballistic Resistant Protective Materials.

(n)–(w) [Reserved]

(x) Commodities, software, and technical data subject to the EAR (*see* §120.42 of this subchapter) used in or with defense articles controlled in this category.

NOTE TO PARAGRAPH (x): Use of this paragraph is limited to license applications for defense articles controlled in this category where the purchase documentation includes commodities, software, or technical data subject to the EAR (*see* §123.1(b) of this subchapter).

CATEGORY XIV—TOXICOLOGICAL AGENTS, INCLUDING CHEMICAL AGENTS, BIOLOGICAL AGENTS, AND ASSOCIATED EQUIPMENT

*(a) Chemical agents, to include:

(1) Nerve agents:

(i) O-Alkyl (equal to or less than $C_{10}$, including cycloalkyl) alkyl (Methyl, Ethyl, n-Propyl or Isopropyl)phosphonofluoridates, such as: Sarin (GB): O-Isopropyl methylphosphonofluoridate (CAS 107–44–8) (CWC Schedule 1A); and Soman (GD): O-Pinacolyl methylphosphonofluoridate (CAS 96–64–0) (CWC Schedule 1A);

(ii) O-Alkyl (equal to or less than $C_{10}$, including cycloalkyl) N,N-dialkyl (Methyl, Ethyl, n-Propyl or Isopropyl)phosphoramidocyanidates, such as: Tabun (GA): O-Ethyl N, N-dimethylphosphoramidocyanidate (CAS 77–81–6) (CWC Schedule 1A);

(iii) O-Alkyl (H or equal to or less than $C_{10}$, including cycloalkyl) S–2-dialkyl (Methyl, Ethyl, n-Propyl or Isopropyl)aminoethyl alkyl (Methyl, Ethyl, n-Propyl or Isopropyl)phosphonothiolates and corresponding alkylated and protonated salts, such as: VX: O-Ethyl S-2-diisopropylaminoethyl methyl phosphonothiolate (CAS 50782–69–9) (CWC Schedule 1A);

(2) Amiton: O,O-Diethyl S-[2(diethylamino)ethyl] phosphorothiolate and corresponding alkylated or protonated salts (CAS 78–53–5) (CWC Schedule 2A);

(3) Vesicant agents:

(i) Sulfur mustards, such as: 2-Chloroethylchloromethylsulfide (CAS 2625–76–5) (CWC Schedule 1A); Bis(2-chloroethyl)sulfide (CAS 505–60–2) (CWC Schedule 1A); Bis(2-chloroethylthio)methane (CAS 63839–13–6) (CWC Schedule 1A); 1,2-bis (2-chloroethylthio)ethane (CAS 3563–36–8) (CWC Schedule 1A); 1,3-bis (2-chloroethylthio)-n-propane (CAS 63905–10–2) (CWC Schedule 1A); 1,4-bis (2-chloroethylthio)-n-butane (CWC Schedule 1A); 1,5-bis (2-chloroethylthio)-n-pentane (CWC Schedule 1A); Bis (2-chloroethylthiomethyl)ether (CWC Schedule 1A); Bis (2-chloroethylthioethyl)ether (CAS 63918–89–8) (CWC Schedule 1A);

(ii) Lewisites, such as: 2-chlorovinyldichloroarsine (CAS 541–25–3) (CWC Schedule 1A); Tris (2-chlorovinyl) arsine (CAS 40334–70–1) (CWC Schedule 1A); Bis (2-chlorovinyl) chloroarsine (CAS 40334–69–8) (CWC Schedule 1A);

(iii) Nitrogen mustards, such as: HN1: bis (2-chloroethyl) ethylamine (CAS 538–07–8) (CWC Schedule 1A); HN2: bis (2-chloroethyl) methylamine (CAS 51–75–2) (CWC Schedule 1A); HN3: tris (2-chloroethyl)amine (CAS 555–77–1) (CWC Schedule 1A);

(iv) Ethyldichloroarsine (ED);

(v) Methyldichloroarsine (MD);

(4) Incapacitating agents, such as:

(i) 3-Quinuclindinyl benzilate (BZ) (CAS 6581–06–2) (CWC Schedule 2A);

(ii) Diphenylchloroarsine (DA) (CAS 712–48–1);

(iii) Diphenylcyanoarsine (DC);

*(b) Biological agents and biologically derived substances specifically developed, configured, adapted, or modified for the purpose of increasing their capability to produce casualties in humans or livestock, degrade equipment or damage crops.

*(c) Chemical agent binary precursors and key precursors, as follows:

(1) Alkyl (Methyl, Ethyl, n-Propyl or Isopropyl) phosphonyl difluorides, such as: DF: Methyl Phosphonyldifluoride (CAS 676–99–3) (CWC Schedule 1B); Methylphosphinyldifluoride;

(2) O-Alkyl (H or equal to or less than $C_{10}$, including cycloalkyl) O–2-dialkyl (methyl, ethyl, n-Propyl or isopropyl)aminoethyl alkyl (methyl, ethyl, N-propyl or isopropyl)phosphonite and corresponding alkylated and protonated salts, such as: QL: O-Ethyl-2-di-isopropylaminoethyl methylphosphonite (CAS 57856–11–8) (CWC Schedule 1B);

(3) Chlorosarin: O-Isopropyl methylphosphonochloridate (CAS 1445–76–7) (CWC Schedule 1B);

(4) Chlorosoman: O-Pinakolyl methylphosphonochloridate (CAS 7040–57–5) (CWC Schedule 1B);

(5) DC: Methlyphosphonyl dichloride (CAS 676–97–1) (CWC Schedule 2B); Methylphosphinyldichloride;

(d) Tear gases and riot control agents including:

(1) Adamsite (Diphenylamine chloroarsine or DM) (CAS 578–94–9);

(2) CA (Bromobenzyl cyanide) (CAS 5798–79–8);

(3) CN (Phenylacyl chloride or w-Chloroacetophenone) (CAS 532–27-4);

(4) CR (Dibenz-(b,f)-1,4-oxazephine) (CAS 257–07–8);

(5) CS (o-Chlorobenzylidenemalononitrile or o-Chlorobenzalmalononitrile) (CAS 2698–41–1);

(6) Dibromodimethyl ether (CAS 4497–29–4);

(7) Dichlorodimethyl ether (ClCi) (CAS 542–88–1);

(8) Ethyldibromoarsine (CAS 683–43–2);

(9) Bromo acetone;

(10) Bromo methylethylketone;

(11) Iodo acetone;

(12) Phenylcarbylamine chloride;

(13) Ethyl iodoacetate;

(e) Defoliants, as follows:

(1) Agent Orange (2,4,5–Trichlorophenoxyacetic acid mixed with 2,4-dichlorophenoxyacetic acid);

(2) LNF (Butyl 2-chloro-4-fluorophenoxyacetate)

*(f) Equipment and its components, parts, accessories, and attachments specifically designed or modified for military operations and compatibility with military equipment as follows:

(1) The dissemination, dispersion or testing of the chemical agents, biological agents, tear gases and riot control agents, and defoliants listed in paragraphs (a), (b), (d), and (e), respectively, of this category;

(2) The detection, identification, warning or monitoring of the chemical agents and biological agents listed in paragraph (a) and (b) of this category;

(3) Sample collection and processing of the chemical agents and biological agents listed in paragraph (a) and (b) of this category;

(4) Individual protection against the chemical and biological agents listed in paragraphs (a) and (b) of this category.

(5) Collective protection against the chemical agents and biological agents listed in paragraph (a) and (b) of this category.

(6) Decontamination or remediation of the chemical agents and biological agents listed in paragraph (a) and (b) of this category.

(g) Antibodies, polynucleoides, biopolymers or biocatalysts specifically designed or modified for use with articles controlled in paragraph (f) of this category.

(h) Medical countermeasures, to include pre- and post-treatments, vaccines, antidotes and medical diagnostics, specifically designed or modified for use with the chemical agents listed in paragraph (a) of this category and vaccines with the sole purpose of protecting against biological agents identified in paragraph (b) of this category. Examples include: barrier creams specifically designed to be applied to skin and personal equipment to protect against vesicant agents controlled in paragraph (a) of this category; atropine auto injectors specifically designed to counter nerve agent poisoning.

(i) Modeling or simulation tools specifically designed or modified for chemical or biological weapons design, development or employment. The concept of modeling and simulation includes software covered by paragraph (m) of this category specifically designed to reveal susceptibility or vulnerability to biological agents or materials listed in paragraph (b) of this category.

(j) Test facilities specifically designed or modified for the certification and qualification of articles controlled in paragraph (f) of this category.

(k) Equipment, components, parts, accessories, and attachments, exclusive of incinerators (including those which have specially designed waste supply systems and special handling facilities), specifically designed or modified for destruction of the chemical agents in paragraph (a) or the biological agents in paragraph (b) of this category. This destruction equipment includes facilities specifically designed or modified for destruction operations.

(l) Tooling and equipment specifically designed or modified for the production of articles controlled by paragraph (f) of this category.

(m) Technical data (as defined in §120.10 of this subchapter) and defense services (as defined in §120.9 of this subchapter) related to the defense articles described in paragraphs (a) through (l) of this category. (See §125.4 of this subchapter for exemptions.) Technical data directly related to the manufacture or production of any defense articles described

elsewhere in this Category that are designated as Significant Military Equipment (SME) shall itself be designated as SME.

(n) The following interpretations explain and amplify the terms used in this category and elsewhere in this subchapter.

(1) A chemical agent in category XIV(a) is a substance having military application, which by its ordinary and direct chemical action, produces a powerful physiological effect.

(2) The biological agents or biologically derived substances in paragraph (b) of this category are those agents and substances capable of producing casualties in humans or livestock, degrading equipment or damaging crops and which have been modified for the specific purpose of increasing such effects. Examples of such modifications include increasing resistance to UV radiation or improving dissemination characteristics. This does not include modifications made only for civil applications (e.g., medical or environmental use).

(3) The destruction equipment controlled by this category related to biological agents in paragraph (b) is that equipment specifically designed to destroy only the agents identified in paragraph (b) of this category.

(4)(i) The individual protection against the chemical and biological agents controlled by this category includes military protective clothing and masks, but not those items designed for domestic preparedness (e.g., civil defense). Domestic preparedness devices for individual protection that integrate components and parts identified in this subparagraph are licensed by the Department of Commerce when such components are:

(A) Integral to the device;

(B) inseparable from the device; and,

(C) incapable of replacement without compromising the effectiveness of the device.

(ii) Components and parts identified in this subparagraph exported for integration into domestic preparedness devices for individual protection are subject to the controls of the ITAR;

(5) Technical data and defense services in paragraph (l) include libraries, databases and algorithms specifically designed or modified for use with articles controlled in paragraph (f) of this category.

(6) The tooling and equipment covered by paragraph (l) of this category includes molds used to produce protective masks, overboots, and gloves controlled by paragraph (f) and leak detection equipment specifically designed to test filters controlled by paragraph (f) of this category.

(7) The resulting product of the combination of any controlled or non-controlled substance compounded or mixed with any item controlled by this subchapter is also subject to the controls of this category.

NOTE 1: This Category does not control formulations containing 1% or less CN or CS or individually packaged tear gases or riot control agents for personal self-defense purposes.

NOTE 2: Categories XIV(a) and (d) do not include the following:

(1) Cyanogen chloride;
(2) Hydrocyanic acid;
(3) Chlorine;
(4) Carbonyl chloride (Phosgene);
(5) Ethyl bromoacetate;
(6) Xylyl bromide;
(7) Benzyl bromide;
(8) Benzyl iodide;
(9) Chloro acetone;
(10) Chloropicrin (trichloronitromethane);
(11) Fluorine;
(12) Liquid pepper.

NOTE 3: Chemical Abstract Service (CAS) registry numbers do not cover all the substances and mixtures controlled by this category. The numbers are provided as examples to assist the government agencies in the license review process and the exporter when completing their license application and export documentation.

NOTE 4: With respect to U.S. obligations under the Chemical Weapons Convention (CWC), refer to Chemical Weapons Convention Regulations (CWCR) (15 CFR parts 710 through 722). As appropriate, the CWC schedule is provided to assist the exporter.

NOTE 5: Pharmacological formulations containing nitrogen mustards and certain reference standards for these drugs are not considered to be chemical agents and are licensed by the Department of Commerce when:

(1) The drug is in the form of a final medical product; or

(2) The reference standard contains salts of HN2 [bis(2-chloroethyl) methylamine], the quantity to be shipped is 150 milligrams or less, and individual shipments do not exceed twelve per calendar year per end user.

Technical data for the production of HN1 [bis(2-chloroethyl)ethylamine]; HN2 [bis(2-chloroethyl)methylamine], HN3 [tris(2-chloroethyl)amine]; or salts of these, such as tris (2-chloroethyl)amine hydrochloride, remains controlled under this Category.

### CATEGORY XV— SPACECRAFT AND RELATED ARTICLES

(a) Spacecraft, including satellites and space vehicles, whether designated developmental, experimental, research, or scientific, or having a commercial, civil, or military end-use, that:

*(1) Are specially designed to mitigate effects (e.g., scintillation) of or for detection of a nuclear detonation;

*(2) Autonomously track ground, airborne, missile, or space objects in real-time using imaging, infrared, radar, or laser systems;

*(3) Conduct signals intelligence (SIGINT) or measurement and signatures intelligence (MASINT);

*(4) Are specially designed to be used in a constellation or formation that when operated together, in essence or effect, form a virtual satellite (e.g., functioning as if one satellite) with the characteristics or functions of other items in paragraph (a);

*(5) Are anti-satellite or anti-spacecraft (e.g., kinetic, RF, laser, charged particle);

*(6) Have space-to-ground weapons systems (e.g., kinetic or directed energy);

*(7) Have any of the following electro-optical remote sensing capabilities or characteristics:

(i) Electro-optical visible and near infrared (VNIR) (*i.e.*, 400nm to 1,000nm) or infrared (*i.e.*, greater than 1,000nm to 30,000nm) with less than 40 spectral bands and having a clear aperture greater than 0.35 meters;

(ii) Electro-optical hyperspectral with 40 spectral bands or more in the VNIR, short-wavelength infrared (SWIR) (*i.e.*, greater than 1,000nm to 2,500nm) or any combination of the aforementioned and having a Ground Sample Distance (GSD) less than 30 meters;

(iii) Electro-optical hyperspectral with 40 spectral bands or more in the mid-wavelength infrared (MWIR) (*i.e.*, greater than 2,500nm to 5,500nm) having a narrow spectral bandwidth of $\Delta\lambda$ less than or equal to 20nm full width at half maximum (FWHM) or having a wide spectral bandwidth with $\Delta\lambda$ greater than 20nm FWHM and a GSD less than 200 meters; or

(iv) Electro-optical hyperspectral with 40 spectral bands or more in the long-wavelength infrared (LWIR) (*i.e.*, greater than 5,500nm to 30,000nm) having a narrow spectral bandwidth of $\Delta\lambda$ less than or equal to 50nm FWHM or having a wide spectral bandwidth with $\Delta\lambda$ greater than 50nm FWHM and a GSD less than 500 meters;

NOTE 1 TO PARAGRAPH (a)(7): Ground Sample Distance (GSD) is measured from a spacecraft's nadir (*i.e.*, local vertical) position.

NOTE 2 TO PARAGRAPH (a)(7): Optical remote sensing spacecraft or satellite spectral bandwidth is the smallest difference in wavelength (*i.e.*, $\Delta\lambda$) that can be distinguished at full width at half maximum (FWHM) of wavelength $\lambda$.

NOTE 3 TO PARAGRAPH (a)(7): An optical satellite or spacecraft is not Significant Military Equipment (*see* §120.7 of this subchapter) if non-earth pointing.

*(8) Have radar remote sensing capabilities or characteristics (e.g., active electronically scanned array (AESA), synthetic aperture radar (SAR), inverse synthetic aperture radar (ISAR), ultra-wideband SAR), except those having a center frequency equal to or greater than 1 GHz but less than or equal to 10 GHz and having a bandwidth less than 300 MHz;

(9) Provide Positioning, Navigation, and Timing (PNT) signals;

NOTE TO PARAGRAPH (a)(9): This paragraph does not control a satellite or spacecraft that provides only a differential correction broadcast for the purposes of positioning, navigation, or timing.

(10) Provide space-based logistics, surveillance, assembly, repair, or servicing of any spacecraft (e.g., refueling) and have integrated propulsion other than that required for attitude control;

(11) Provide for sub-orbital or in-space human habitation and have integrated propulsion other than that required for attitude control;

(12) That are not commercial communications satellites and that have integrated propulsion other than for attitude control or achieving initial orbit;

*(13) Are classified, contain classified software or hardware, are manufactured using classified production data, or are being developed using classified information (e.g., having classified requirements, specifications, functions, or operational characteristics or include classified cryptographic items controlled under USML Category XIII of this subchapter). ''Classified'' means classified pursuant to Executive Order 13526, or predecessor order, and a security classification guide developed pursuant thereto or equivalent, or to the corresponding classification rules of another government or international organization.

NOTE 1 TO PARAGRAPH (a): Spacecraft not identified in this paragraph are subject to the EAR (*see* ECCNs 9A004 and 9A515). Spacecraft described in ECCNs 9A004 and 9A515 remain subject to the EAR even if defense articles described on the USML are incorporated therein, except when such incorporation results in a spacecraft described in this paragraph.

NOTE 2 TO PARAGRAPH (a): This paragraph does not control (a) the International Space Station (ISS) and its specially designed (as defined in the EAR) parts and components, which are subject to the EAR, or (b) those articles for the ISS that are determined to be subject to the EAR via a commodity jurisdiction determination (*see* §120.4 of this subchapter). Use of a defense article on the ISS that was not specially designed (as defined in the EAR) for the ISS does not cause the item to become subject to the EAR.

NOTE 3 TO PARAGRAPH (a): Attitude control is the exercise of control over spacecraft orientation (e.g., pointing) within an orbital plane, which may include orbit maintenance using the attitude control thrusters.

(b) Ground control systems or training simulators, specially designed for telemetry, tracking, and control (TT&C) of spacecraft in paragraph (a) of this category.

NOTE TO PARAGRAPH (b): Parts, components, accessories, attachments, equipment,

or systems that are common to ground control systems or training simulators controlled in this paragraph and those that are used for spacecraft not controlled in paragraph (a) of this category are subject to the EAR.

(c) Global Positioning System (GPS) receiving equipment specially designed for military application, or GPS receiving equipment with any of the following characteristics, and specially designed parts and components therefor:

(1) Specially designed for encryption or decryption (e.g., Y-Code) of GPS precise positioning service (PPS) signals (MT if designed or modified for airborne applications);

(2) [Reserved]

(3) Specially designed for use with a null steering antenna, an electronically steerable antenna, or including a null steering antenna designed to reduce or avoid jamming signals (MT if designed or modified for airborne applications);

NOTE TO PARAGRAPH (c)(3): The articles described in this paragraph are subject to the EAR when, prior to export, reexport, retransfer, or temporary import, they are integrated into and included as an integral part of an item subject to the EAR. Articles do not become subject to the EAR until integrated into the item subject to the EAR. Export, reexport, retransfer, or temporary import of, and technical data and defense services directly related to, defense articles intended to be integrated remain subject to the ITAR.

(4) Specially designed for use with rockets, missiles, SLVs, drones, or unmanned air vehicle systems capable of delivering at least a 500 kg payload to a range of at least 300 km (MT if designed or modified for rockets, missiles, SLVs, drones, or unmanned air vehicle systems controlled in this subchapter).

NOTE TO PARAGRAPH (c)(4): ''Payload'' is the total mass that can be carried or delivered by the specified rocket, missile, SLV, drone or unmanned aerial vehicle that is not used to maintain flight. For definition of ''range'' as it pertains to rocket systems, *see* note 1 to paragraph (a) of USML Category IV For definition of ''range'' as it pertains to aircraft systems, *see* note to paragraph (a) of USML Category VIII.

(d) [Reserved]

(e) Spacecraft parts, components, accessories, attachments, equipment, or systems, as follows:

(1) Antenna systems specially designed for spacecraft that:

(i) Have a dimension greater than 25 meters in diameter or length of the major axis;

(ii) Employ active electronic scanning;

(iii) Are adaptive beam forming; or

(iv) Are for interferometric radar;

(2) Space-qualified optics (*i.e.*, lens or mirror), including optical coating, having active properties (e.g., adaptive, deformable) with a largest lateral clear aperture dimension greater than 0.35 meters;

(3) Space-qualified focal plane arrays (FPA) having a peak response in the wavelength range exceeding 900nm and readout integrated circuit (ROIC), whether separate or integrated, specially designed therefor;

(4) Space-qualified mechanical (*i.e.*, active) cryocooler or active cold finger, and associated control electronics specially designed therefor;

(5) Space-qualified active vibration suppression, including active isolation and active dampening, and associated control electronics therefor;

(6) Optical bench assemblies specially designed to enable spacecraft to meet or exceed the parameters described in paragraph (a) of this category;

(7) Space-qualified kinetic or directed-energy systems (e.g., RF, laser, charged particle) specially designed for spacecraft in paragraph (a)(5) or (a)(6) of this category, and specially designed parts and components therefor (e.g., power conditioning and beam-handling/switching, propagation, tracking, and pointing equipment);

(8) [Reserved]

(9) Space-qualified cesium, rubidium, hydrogen maser, or quantum (e.g., based upon Al, Hg, Yb, Sr, Be Ions) atomic clocks, and specially designed parts and components therefor;

(10) Attitude determination and control systems, and specially designed parts and components therefor, that provide a spacecraft's geolocation accuracy, without using Ground Location Points, better than or equal to:

(i) 5 meters (CE90) from low earth orbit (LEO);

(ii) 30 meters (CE90) from medium earth orbit (MEO);

(iii) 150 meters (CE90) from geosynchronous orbit (GEO); or

(iv) 225 meters (CE90) from high earth orbit (HEO);

(11) Space-based systems, and specially designed parts and components therefor, as follows:

(i) Nuclear reactors and associated power conversion systems (e.g., liquid metal or gas-cooled fast reactors);

(ii) Radioisotope-based power systems (e.g., radioisotope thermoelectric generators);

(iii) Nuclear thermal propulsion systems (e.g., solid core, liquid core, gas core fission); or

(iv) Plasma based propulsion systems;

(12) Thrusters (e.g., rocket engines) that provide greater than 150 lbf (*i.e.*, 667.23 N) vacuum thrust (MT for rocket motors or engines having a total impulse capacity equal to or greater than 8.41x10∧5 newton seconds);

(13) Control moment gyroscope (CMG) specially designed for spacecraft;

(14) Space-qualified monolithic microwave integrated circuits (MMIC) that combine transmit and receive (T/R) functions on a single die as follows:

(i) Having a power amplifier with maximum saturated peak output power (in watts), Psat, greater than 200 divided by the maximum operating frequency (in GHz) squared [Psat >200 W*GHz2/fGHz2]; or

(ii) Having a common path (e.g., phase shifter-digital attenuator) circuit with greater than 3 bits phase shifting at operating frequencies 10 GHz or below, or greater than 4 bits phase shifting at operating frequencies above 10 GHz;

(15) Space-qualified oscillator for radar in paragraph (a) of this category with phase noise less than −120 dBc/Hz + (20 log10(RF) (in GHz)) measured at 2 KHz*RF (in GHz) from carrier;

(16) Space-qualified star tracker or star sensor with angular accuracy less than or equal to 1 arcsec (1-Sigma) per star coordinate, and a tracking rate equal to or greater than 3.0 deg/sec, and specially designed parts and components therefor (MT);

*(17) Primary, secondary, or hosted payload that performs any of the functions described in paragraph (a) of this category;

NOTE 1 TO PARAGRAPH (e)(17): *Primary payload* is that complement of equipment designed from the outset to accomplish the prime mission function of the spacecraft payload mission set. The primary payload may operate independently from the secondary payload(s). *Secondary payload* is that complement of equipment designed from the outset to be fully integrated into the spacecraft payload mission set. The secondary payload may operate separately from the primary payload. *Hosted payload* is a complement of equipment or sensors that uses the available or excess capacity (mass, volume, power, etc.) of a spacecraft to accommodate an additional, independent mission. The hosted payload may share the spacecraft bus support infrastructure. The hosted payload performs an additional, independent mission which does not dictate control or operation of the spacecraft. A hosted payload is not capable of operating as an independent spacecraft. *Spacecraft bus* (distinct from the spacecraft payload), provides the support infrastructure of the spacecraft (e.g., command and data handling, communications and antenna(s), electrical power, propulsion, thermal control, attitude and orbit control, guidance, navigation and control, structure and truss, life support (for crewed mission)) and location (e.g., attachment, interface) for the spacecraft payload. *Spacecraft payload* is that complement of equipment attached to the spacecraft bus that performs a particular mission in space (e.g., communications, observation, science).

NOTE 2 TO PARAGRAPH (e)(17): An ECCN 9A004 or ECCN 9A515.a spacecraft remains a spacecraft subject to the EAR even when incorporating a hosted payload performing a function described in paragraph (a) of this category. All spacecraft that incorporate primary or secondary payloads that perform a function described in paragraph (a) of this category are controlled by that paragraph.

*(18) Secondary or hosted payload, and specially designed parts and components therefor, developed with Department of Defense-funding;

NOTE 1 TO PARAGRAPH (e)(18): This paragraph does not control payloads that are (a) determined to be subject to the EAR via a commodity jurisdiction determination (*see* §120.4 of this subchapter), or (b) identified in the relevant Department of Defense contract or other funding authorization or agreement as being developed for both military and either civil or commercial applications.

NOTE 2 TO PARAGRAPH (e)(18): This paragraph is applicable only to those contracts or funding authorizations or agreements that are dated May 13, 2015, or later.

(19) Spacecraft heat shields or heat sinks specially designed for atmospheric entry or re-entry, and specially designed parts and components therefor (MT if usable in rockets, SLVs, missiles, drones, or UAVs capable of delivering a payload of at least 500 kg to a range of at least 300 km);

NOTE TO PARAGRAPH (e)(19): ''Payload'' is the total mass that can be carried or delivered by the specified rocket, SLV, missile, drone, or UAV that is not used to maintain flight. For definition of ''range'' as it pertains to aircraft systems, *see* note to paragraph (a) of USML Category VIII. For definition of ''range'' as it pertains to rocket systems, *see* note 1 to paragraph (a) of USML Category IV.

(20) Equipment modules, stages, or compartments that contain propulsion other than that required for attitude control and can be separated or jettisoned from another spacecraft (*see* note 3 to paragraph (a) of this category); or

*(21) Any part, component, accessory, attachment, equipment, or system that:

(i) Is classified;

(ii) Contains classified software; or

(iii) Is being developed using classified information.

NOTE TO PARAGRAPH (e)(21): ''Classified'' means classified pursuant to Executive Order 13526, or predecessor order, and a security classification guide developed pursuant thereto or equivalent, or to the corresponding classification rules of another government or international organization.

NOTE 1 TO PARAGRAPH (e): Parts, components, accessories, attachments, equipment, or systems specially designed for spacecraft

or other articles enumerated in this category but not listed in paragraph (e) are subject to the EAR.

NOTE 2 TO PARAGRAPH (e): The articles described in this paragraph are subject to the EAR when, prior to export, reexport, retransfer, or temporary import, they are integrated into and included as an integral part of an item subject to the EAR (*see* note 2 to paragraph (e)(17) of this category). Articles do not become subject to the EAR until integrated into the item subject to the EAR. Export, reexport, retransfer, or temporary import of, and technical data and defense services directly related to defense articles intended to be integrated remain subject to the ITAR.

NOTE 3 TO PARAGRAPH (e): For the purposes of this paragraph, an article is space-qualified if it is designed, manufactured, or qualified through successful testing, for operation at altitudes greater than 100 km above the surface of the Earth. The use of an altitude of 100 km above the surface of the Earth in this paragraph does not represent a legal demarcation between national air space and outer space under United States or international law.

NOTE 4 TO PARAGRAPH (e): (1) A determination that a specific article (or commodity) (e.g., by product serial number) is space-qualified by virtue of testing alone does not mean that other articles in the same production run or model series are space-qualified if not individually tested. (2) ''Article'' is synonymous with ''commodity,'' as defined in EAR §772.1. (3) A specific article not designed or manufactured for use at altitudes greater than 100 km above the surface of the Earth is not space-qualified before it is successfully tested. (4) The terms ''designed'' and ''manufactured'' in this definition are synonymous with ''specially designed.''

(f) Technical data (*see* §120.10 of this subchapter) and defense services (*see* §120.9 of this subchapter) directly related to the defense articles described in paragraphs (a) through (e) of this category and classified technical data directly related to items controlled in ECCNs 9A515, 9B515, or 9D515 and defense services using the classified technical data. Defense services include the furnishing of assistance (including training) in the integration of a satellite or spacecraft to a launch vehicle, including both planning and onsite support, regardless of the jurisdiction, ownership, or origin of the satellite or spacecraft, or whether technical data is used. It also includes the furnishing of assistance (including training) in the launch failure analysis of a satellite or spacecraft, regardless of the jurisdiction, ownership, or origin of the satellite of spacecraft, or whether technical data is used. (*See* §125.4 of this subchapter for exemptions, and §124.15 of this subchapter for special export controls for satellites and satellite launches.) (MT for technical data and defense services related to articles designated as such.)

NOTE 1 TO PARAGRAPH (f): The technical data control of this paragraph does not apply to certain technical data directly related to articles described in paragraphs (c) or (e) of this category when such articles are integrated into and included as an integral part of a satellite subject to the EAR. For controls in these circumstances, *see* ECCN 9E515. This only applies to that level of technical data (including marketing data) necessary and reasonable for a purchaser to have assurance that a U.S. built item intended to operate in space has been designed, manufactured, and tested in conformance with specified contract requirements (e.g., operational performance, reliability, lifetime, product quality, or delivery expectations) as well as data necessary for normal orbit satellite operations, to evaluate in-orbit anomalies, and to operate and maintain associated ground station equipment (except encryption hardware).

NOTE 2 TO PARAGRAPH (f): Activities and technology/technical data directly related to or required for the spaceflight (e.g., sub-orbital, orbital, lunar, interplanetary, or otherwise beyond Earth orbit) passenger or participant experience, regardless of whether the passenger or participant experience is for space tourism, scientific or commercial research, commercial manufacturing/production activities, educational, media, or commercial transportation purposes, are not subject to the ITAR or the EAR. Such activities and technology/technical data include those directly related to or required for: (a) Spacecraft access, ingress, and egress, including the operation of all spacecraft doors, hatches, and airlocks; (b) physiological training (e.g., human-rated centrifuge training or parabolic flights, pressure suit or spacesuit training/operation); (c) medical evaluation or assessment of the spaceflight passenger or participant; (d) training for and operation by the passenger or participant of health and safety related hardware (e.g., seating, environmental control and life support, hygiene facilities, food preparation, exercise equipment, fire suppression, communications equipment, safety-related clothing or headgear) or emergency procedures; (e) viewing of the interior and exterior of the spacecraft or terrestrial mock-ups; (f) observing spacecraft operations (e.g., pre-flight checks, landing, in-flight status); (g) training in spacecraft or terrestrial mock-ups for connecting to or operating passenger or participant equipment used for purposes other than operating the spacecraft; or (h) donning, wearing, or utilizing the passenger's or participant's flight suit, pressure suit, or spacesuit, and personal equipment.

NOTE 3 TO PARAGRAPH (f): Neither paragraph (f) nor ECCN 9E515 controls the data

transmitted to or from a satellite or spacecraft, whether real or simulated, when limited to information about the health, operational status, or function of, or measurements or raw sensor output from, the spacecraft, spacecraft payload(s), or their associated subsystems or components. Such data or technology is subject to the EAR and is designated EAR99. Examples of such data and technology, which are commonly referred to as ''housekeeping data,'' include (a) system, hardware, component configuration, and operation status information pertaining to temperatures, pressures, power, currents, voltages, and battery charges; (b) spacecraft or payload orientation or position information, such as state vector or ephemeris information; (c) payload raw mission or science output, such as images, spectra, particle measurements, or field measurements; (d) command responses; (e) accurate timing information; and (f) link budget data. The act of processing such telemetry data—*i.e.*, converting raw data into engineering units or readable products—or encrypting it does not, in and of itself, cause the telemetry data to become subject to the ITAR or to ECCN 9E515. All classified technical data directly related to items controlled in USML Category XV or ECCNs 9A515, and defense services using the classified technical data, remain subject to the ITAR. This note does not affect controls in paragraph (f), ECCN 9D515, or ECCN 9E515 on software source code or commands that control a spacecraft, payload, or associated subsystem.

(g)–(w) [Reserved]

(x) Commodities, software, and technology subject to the EAR (*see* §120.42 of this subchapter) used in or with defense articles controlled in this category.

NOTE TO PARAGRAPH (x): Use of this paragraph is limited to license applications for defense articles controlled in this category where the purchase documentation also includes commodities, software, or technology subject to the EAR (*see* §123.21(b) of this subchapter).

### CATEGORY XVI—NUCLEAR WEAPONS RELATED ARTICLES

(a) [Reserved]

*(b) Modeling or simulation tools that model or simulate the environments generated by nuclear detonations or the effects of these environments on systems, subsystems, components, structures, or humans.

(c) [Reserved]

(d) Parts, components, accessories, attachments, associated equipment, and production, testing, and inspection equipment and tooling, specially designed for the articles in paragraph (b) of this category.

(e) Technical data (*see* §120.10 of this subchapter) and defense services (*see* §120.9 of this subchapter) directly related to the defense articles described in paragraph (b) of this category. (*See* §123.20 of this subchapter for nuclear related controls.)

(f)–(w) [Reserved]

(x) Commodities, software, and technical data subject to the EAR (*see* §120.42 of this subchapter) used in or with defense articles controlled in this category.

NOTE TO PARAGRAPH (x): Use of this paragraph is limited to license applications for defense articles controlled in this category where the purchase documentation includes commodities, software, or technical data subject to the EAR (*see* §123.1(b) of this subchapter).

### CATEGORY XVII—CLASSIFIED ARTICLES, TECHNICAL DATA, AND DEFENSE SERVICES NOT OTHERWISE ENUMERATED

*(a) All articles, and technical data (*see* §120.10 of this subchapter) and defense services (*see* §120.9 of this subchapter) relating thereto, that are classified in the interests of national security and that are not otherwise enumerated on the U.S. Munitions List.

### CATEGORY XVIII—DIRECTED ENERGY WEAPONS

*(a) Directed energy weapon systems specifically designed or modified for military applications (e.g., destruction, degradation or rendering mission-abort of a target). These include, but are not limited to:

(1) Laser systems, including continuous wave or pulsed laser systems, specifically designed or modified to cause blindness;

(2) Lasers of sufficient continuous wave or pulsed power to effect destruction similar to the manner of conventional ammunition;

(3) Particle beam systems;

(4) Particle accelerators that project a charged or neutral particle beam with destructive power;

(5) High power radio-frequency (RF) systems;

(6) High pulsed power or high average power radio frequency beam transmitters that produce fields sufficiently intense to disable electronic circuitry at distant targets;

(7) Prime power generation, energy storage, switching, power conditioning, thermal management or fuel-handling equipment;

(8) Target acquisition or tracking systems;

(9) Systems capable or assessing target damage, destruction or mission-abort;

(10) Beam-handling, propagation or pointing equipment;

(11) Equipment with rapid beam slew capability for rapid multiple target operations;

(12) Negative ion beam funneling equipment; and,

(13) Equipment for controlling and slewing a high-energy ion beam.

*(b) Equipment specifically designed or modified for the detection or identification

of, or defense against, articles controlled in paragraph (a) of this category.

(c) Tooling and equipment specifically designed or modified for the production of defense articles controlled by this category.

(d) Test and evaluation equipment and test models specifically designed or modified for the defense articles controlled by this category. This includes, but is not limited to, diagnostic instrumentation and physical test models.

(e) Components, parts, accessories, attachments and associated equipment specifically designed or modified for the articles in paragraphs (a) through (d) of this category.

(f) Technical data (as defined in §120.10 of this subchapter) and defense services (as defined in §120.9 of this subchapter) directly related to the defense articles described in paragraphs (a) through (e) of this category. Technical data directly related to the manufacture or production of any defense articles described in this category that are designated as Significant Military Equipment (SME) shall itself be designated SME.

(g) The following interpretations explain and amplify terms used in this category and elsewhere in this subchapter:

(1) The components, parts, accessories, attachments and associated equipment include, but are not limited to adaptive optics and phase conjugators components, space-qualified accelerator components, targets and specifically designed target diagnostics, current injectors for negative hydrogen ion beams, and space-qualified foils for neutralizing negative hydrogen isotope beams.

(2) The particle beam systems in paragraph (a)(3) of this category include devices embodying particle beam and electromagnetic pulse technology and associated components and subassemblies (e.g., ion beam current injectors, particle accelerators for neutral or charged particles, beam handling and projection equipment, beam steering, fire control, and pointing equipment, test and diagnostic instruments, and targets) which are specifically designed or modified for directed energy weapon applications.

(3) The articles controlled in this category include any end item, component, accessory, attachment, part, firmware, software or system that has been designed or manufactured using technical data and defense services controlled by this category.

(4) The articles specifically designed or modified for military application controlled in this category include any articles specifically developed, configured, or adapted for military application.

### CATEGORY XIX—GAS TURBINE ENGINES AND ASSOCIATED EQUIPMENT

*(a) Turbofan and Turbojet engines (including technology demonstrators) capable of 15,000 lbf (66.7 kN) of thrust or greater that have any of the following:

(1) with or specially designed for thrust augmentation (afterburner);

(2) thrust or exhaust nozzle vectoring;

(3) parts or components controlled in paragraph (f)(6) of this category;

(4) specially designed for sustained 30 second inverted flight or negative g maneuver; or

(5) specially designed for high power extraction (greater than 50 percent of engine thrust at altitude) at altitudes greater than 50,000 feet.

*(b) Turboshaft and Turboprop engines (including technology demonstrators) capable of 1500 mechanical shp (1119 kW) or greater and are specially designed with oil sump sealing when the engine is in the vertical position.

*(c) Engines (including technology demonstrators) specially designed for armed or military unmanned aerial vehicle systems, cruise missiles, or target drones (MT if for an engine used in an unmanned aerial vehicle, drone, or missile that has a ''range'' equal to or greater than 300 km).

*(d) GE38, AGT1500, CTS800, TF40B, T55, TF60, and T700 engines.

*(e) Digital engine control systems (e.g., Full Authority Digital Engine Controls (FADEC) and Digital Electronic Engine Controls (DEEC)) specially designed for gas turbine engines controlled in this category (MT if the digital engine control system is for an unmanned aerial vehicle, drone, or missile that has a range equal to or greater than 300 km).

NOTE TO PARAGRAPH (e): Digital electronic control systems autonomously control the engine throughout its whole operating range from demanded engine start until demanded engine shut-down, in both normal and fault conditions. For the definition of ''range,'' *see* note to paragraph (a) of USML Category VIII.

(f) Parts, components, accessories, attachments, associated equipment, and systems as follows:

(1) Parts, components, accessories, attachments, and equipment specially designed for the following U.S.-origin engines (and military variants thereof): AE1107C, F101, F107, F112, F118, F119, F120, F135, F136, F414, F415, J402, GE38, TF40B, and TF60;

NOTE TO PARAGRAPH (f)(1): Specially designed (*see* §120.41(b)(3)(ii) of this subchapter) does not control parts, components, accessories, and attachments that are common to engines enumerated in paragraph (a) through (d) of this category but not identified in paragraph (f)(1), and those identified in paragraph (f)(1). For example, a part common to only the F110 and F136 is not specially designed for purposes of the ITAR. A part common to only the F119 and F135—two engine models identified in paragraph (f)(1)—is specially designed.

*(2) Hot section components (*i.e.*, combustion chambers and liners; high pressure turbine blades, vanes, disks and related cooled structure; cooled low pressure turbine blades, vanes, disks and related cooled structure; cooled augmenters; and cooled nozzles) specially designed for gas turbine engines controlled in this category;

(3) Uncooled turbine blades, vanes, disks, and tip shrouds specially designed for gas turbine engines controlled in this category;

(4) Combustor cowls, diffusers, domes, and shells specially designed for gas turbine engines controlled in this category;

(5) Engine monitoring systems (*i.e.*, prognostics, diagnostics, and health) specially designed for gas turbine engines and components controlled in this category;

*(6) Any part, component, accessory, attachment, equipment, or system that:

(i) is classified;

(ii) contains classified software directly related to defense articles in this subchapter or 600 series items subject to the EAR; or

(iii) is being developed using classified information (*see* §120.10(a)(2) of this subchapter).

''Classified'' means classified pursuant to Executive Order 13526, or predecessor order, and a security classification guide developed pursuant thereto or equivalent, or to the corresponding classification rules of another government or international organization; or

(7) [Reserved]

(g) Technical data (*see* §120.10 of this subchapter) and defense services (*see* §120.9 of this subchapter) directly related to the defense articles described in paragraphs (a) through (f) of this category and classified technical data directly related to items controlled in ECCNs 9A619, 9B619, 9C619, and 9D619 and defense services using the classified technical data. (*See* §125.4 of this subchapter for exemptions.) (MT for technical data and defense services related to articles designated as such.)

(h)–(w) [Reserved]

(x) Commodities, software, and technical data subject to the EAR (*see* §120.42 of this subchapter) used in or with defense articles controlled in this category.

NOTE TO PARAGRAPH (x): Use of this paragraph is limited to license applications for defense articles controlled in this category where the purchase documentation includes commodities, software, or technical data subject to the EAR (*see* §123.1(b) of this subchapter).

### CATEGORY XX—SUBMERSIBLE VESSELS AND RELATED ARTICLES

(a) Submersible and semi-submersible vessels that are:

*(1) Submarines specially designed for military use;

(2) Mine countermeasure vehicles;

(3) Anti-submarine warfare vehicles;

(4) Armed or are specially designed to be used as a platform to deliver munitions or otherwise destroy or incapacitate targets (e.g., firing torpedoes, launching rockets, firing missiles, deploying mines, deploying countermeasures) or deploy military payloads;

(5) Swimmer delivery vehicles specially designed for the deployment, recovery, or support of swimmers or divers from submarines;

(6) Integrated with nuclear propulsion systems;

(7) Equipped with any mission systems controlled under this subchapter; or

NOTE TO PARAGRAPH (a)(7): ''Mission system'' is defined as a ''system'' (see §120.45(g) of this subchapter) that are defense articles that perform specific military functions such as by providing military communication, electronic warfare, target designation, surveillance, target detection, or sensor capabilities.

(8) Developmental vessels funded by the Department of Defense via contract or other funding authorization.

NOTE 1 TO PARAGRAPH (a)(8): This paragraph does not control vessels, and specially designed parts, components, accessories, attachments, and associated equipment therefor, (a) in production, (b) determined to be subject to the EAR via a commodity jurisdiction determination (*see* §120.4 of this subchapter) or (c) identified in the relevant Department of Defense contract or other funding authorization as being developed for both civil and military applications.

NOTE 2 TO PARAGRAPH (a)(8): Note 1 does not apply to defense articles enumerated on the U.S. Munitions List, whether in production or development.

NOTE 3 TO PARAGRAPH (a)(8): This provision is applicable to those contracts and funding authorizations that are dated July 8, 2014, or later.

*(b) Engines, electric motors, and propulsion plants as follows:

(1) Naval nuclear propulsion plants and prototypes, and special facilities for construction, support, and maintenance therefor (*see* §123.20 of this subchapter);

(2) Electric motors specially designed for submarines that have the following:

(i) Power output of more than 0.75 MW (1,000 hp);

(ii) Quick reversing;

(iii) Liquid cooled; and

(iv) Totally enclosed.

(c) Parts, components, accessories, attachments, and associated equipment, including production, testing, and inspection equipment and tooling, specially designed for any of the articles in paragraphs (a) and (b) of this category (MT for launcher mechanisms specially designed for rockets, space launch

vehicles, or missiles capable of achieving a range greater than or equal to 300 km).

NOTE TO PARAGRAPH (c): ''Range'' is the maximum distance that the specified rocket system is capable of traveling in the mode of stable flight as measured by the projection of its trajectory over the surface of the Earth. The maximum capability based on the design characteristics of the system, when fully loaded with fuel or propellant, will be taken into consideration in determining range. The range for rocket systems will be determined independently of any external factors such as operational restrictions, limitations imposed by telemetry, data links, or other external constraints. For rocket systems, the range will be determined using the trajectory that maximizes range, assuming International Civil Aviation Organization (ICAO) standard atmosphere with zero wind.

(d) Technical data (*see* §120.10 of this subchapter) and defense services (*see* §120.9 of this subchapter) directly related to the defense articles described in paragraphs (a) through (c) of this category. (MT for technical data and defense services related to articles designated as such.) (*See* §125.4 of this subchapter for exemptions.)

(e)–(w) [Reserved]

(x) Commodities, software, and technical data subject to the EAR (*see* §120.42 of this subchapter) used in or with defense articles controlled in this category.

NOTE TO PARAGRAPH (x): Use of this paragraph is limited to license applications for defense articles controlled in this category where the purchase documentation includes commodities, software, or technical data subject to the EAR (*see* §123.1(b) of this subchapter).

CATEGORY XXI—ARTICLES, TECHNICAL DATA, AND DEFENSE SERVICES NOT OTHERWISE ENUMERATED

*(a) Any article not enumerated on the U.S. Munitions List may be included in this category until such time as the appropriate U.S. Munitions List category is amended. The decision on whether any article may be included in this category, and the designation of the defense article as not Significant Military Equipment (*see* §120.7 of this subchapter), shall be made by the Director, Office of Defense Trade Controls Policy.

(b) Technical data (*see* §120.10 of this subchapter) and defense services (*see* §120.9 of this subchapter) directly related to the defense articles covered in paragraph (a) of this category.

[58 FR 39287, July 22, 1993, as amended at 80 FR 78131, Dec. 16, 2015]

EDITORIAL NOTES: 1. For FEDERAL REGISTER citations affecting §121.1, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at *www.fdsys.gov*.

2 At 79 FR 61228, Oct. 10, 2014, §121.1 was amended by removing the word ''enumerated'' and adding in its place the word ''described'' in one place in Note 1 to paragraph (i) of Category VI; however, the amendment could not be incorporated because of the inaccurate amendatory instruction.

EFFECTIVE DATE NOTE: At 80 FR 78131, Dec. 16, 2015, §121.1 was amended under Category XI by revising paragraph (b), effective Aug. 30, 2017. For the convenience of the user, the revised text is set forth as follows:

### § 121.1 The United States Munitions List.

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CATEGORY XI—MILITARY ELECTRONICS

* * * * *

*(b) Electronic systems or equipment, not elsewhere enumerated in this sub-chapter, specially designed for intelligence purposes that collect, survey, monitor, or exploit the electromagnetic spectrum (regardless of transmission medium), or for counteracting such activities.

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### §§ 121.2–121.15 [Reserved]

### § 121.16 Missile Technology Control Regime Annex.

Some of the items on the Missile Technology Control Regime Annex are controlled by both the Department of Commerce on the Commodity Control List and by the Department of State on the United States Munitions List. To the extent an article is on the United States Munitions List, a reference appears in parentheses listing the U.S. Munitions List category in which it appears. The following items constitute all items on the Missile Technology Control Regime Annex which are covered by the U.S. Munitions List:

ITEM 1—CATEGORY I

Complete rocket systems (including ballistic missile systems, space launch vehicles, and sounding rockets (see §121.1, Cat. IV(a) and (b))) and unmanned air vehicle systems (including cruise missile systems, see §121.1, Cat. VIII (a), target drones and reconnaissance drones (see §121.1, Cat. VIII (a))) capable of delivering at least a 500 kg payload to a range of at least 300 km.